

	L #	Hits	Search Text	DBs
1	L1	42263	hopper and (feed\$3 or fed)	USPAT
2	L2	1766	postage near3 meter\$3	USPAT
3	L3	107	1 and 2	USPAT
4	L4	87	print\$3 and 3	USPAT
5	L5	6008	hopper with (hold\$3 or held)	USPAT
6	L6	24	4 and 5	USPAT
7	L7	28	4 and seriatim	USPAT
8	L8	48	6 or 7	USPAT
9	L9	4	6 and 7	USPAT

	L #	Hits	Search Text	DBs
1	L1	1766	postage near3 meter\$3	USPAT
2	L2	76	1 and clock and header	USPAT
3	L3	16	date and duration and 2	USPAT
4	L4	1863	print\$3 with header	USPAT
5	L5	0	4 and 3	USPAT
6	L6	10	4 and 1	USPAT
7	L7	4	6 and clock	USPAT
8	L8	89094	voice or speech\$3	USPAT
9	L10	6	3 and 9	USPAT
10	L9	17	2 and 8	USPAT
11	L11	920	8 with header	USPAT
12	L12	20	4 and 11	USPAT
13	L13	0	12 and 1	USPAT

	L #	Hits	Search Text	DBs
1	L1	1766	postage near3 meter\$3	USPAT
2	L2	4251	strip adj tape	USPAT
3	L3	33	1 and 2	USPAT

	L #	Hits	Search Text	DBs
1	L1	5811	message with header	USPAT
2	L2	9865	(voice or speech\$3) near3 message	USPAT
3	L3	782	1 and 2	USPAT
4	L4	258	3 and clock	USPAT
5	L5	63	4 and (duration with message)	USPAT
6	L6	25	5 and stamp	USPAT
7	L7	1863	print\$3 with header	USPAT
8	L8	1	6 and 7	USPAT
9	L9	2	5 and 7	USPAT
10	L10	6	4 and 7	USPAT
11	L11	16574	message near3 number	USPAT
12	L12	174	4 and 11	USPAT
13	L13	3	12 and 7	USPAT



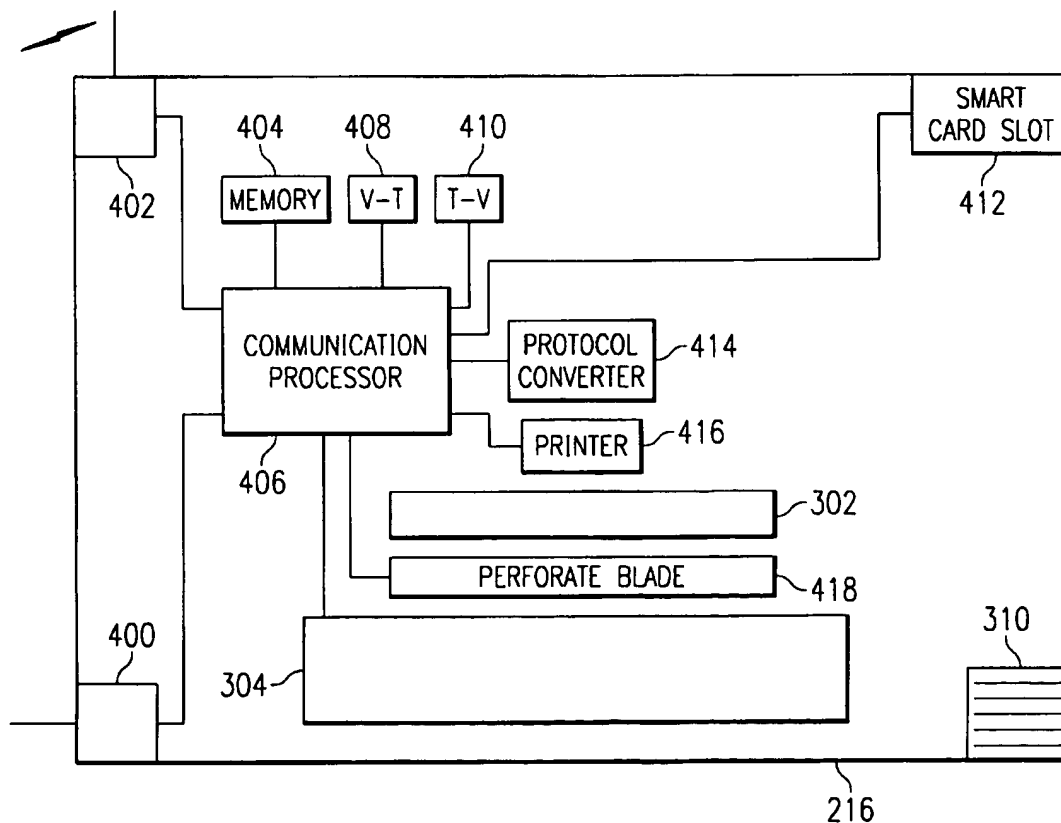
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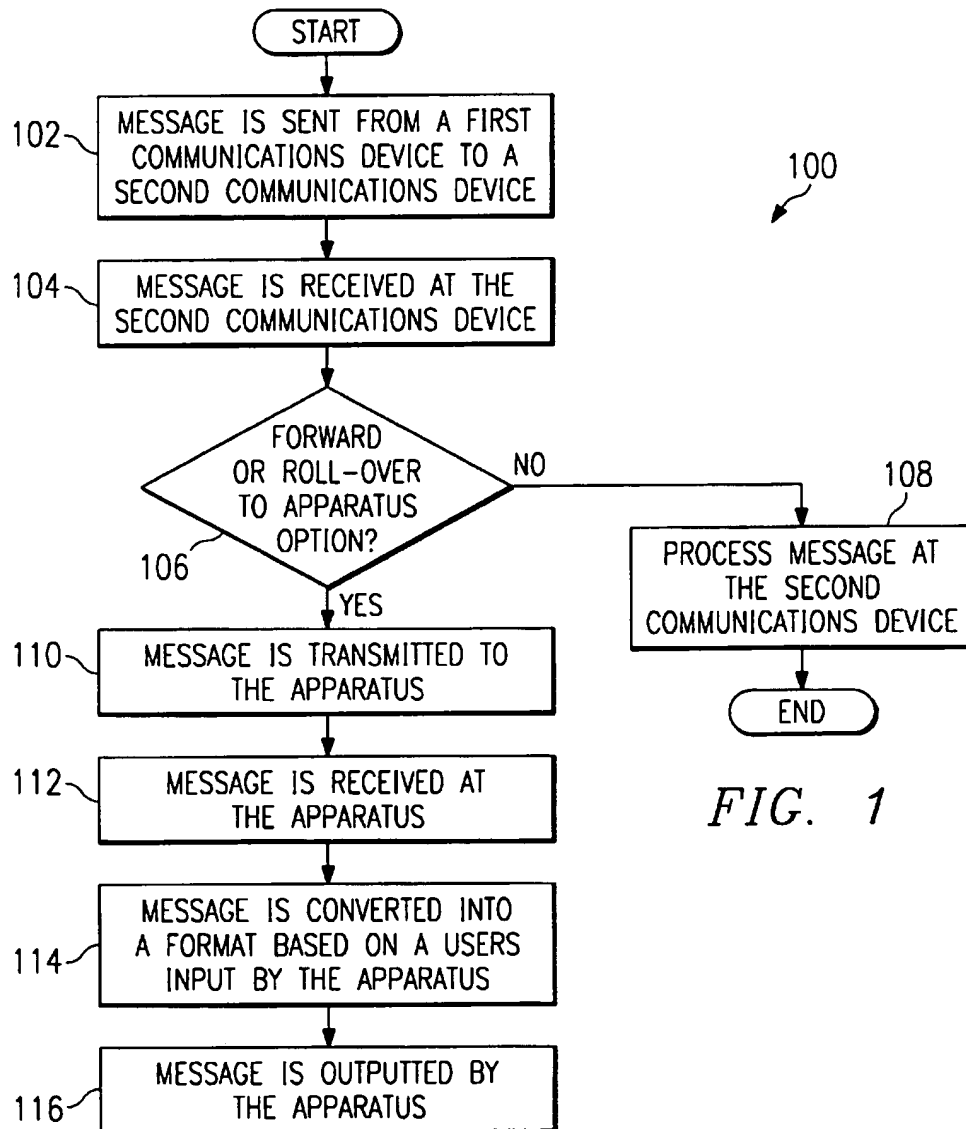
United States Patent [19][11] **Patent Number:** **6,161,007****McCutcheon et al.**[45] **Date of Patent:** **Dec. 12, 2000**[54] **METHOD AND APPARATUS FOR
PROCESSING MULTIPLE TYPES OF
INCOMING COMMUNICATION**5,870,679 2/1999 Ezumi 455/557
5,966,652 10/1999 Coad et al. 455/557[75] **Inventors:** **Lisa A. McCutcheon**, Garland;
Fereidon Homayoun, Plano; **Raffi J.**
Gostanian, McKinney, all of Tex.*Primary Examiner*—**Thanh Cong Le**
Attorney, Agent, or Firm—**John D. Crane**[73] **Assignee:** **Nortel Networks Limited**, Montreal,
Canada[57] **ABSTRACT**[21] **Appl. No.:** **08/939,275**[22] **Filed:** **Sep. 29, 1997**[51] **Int. Cl.⁷** **H04B 1/38**[52] **U.S. Cl.** **455/412; 455/558; 455/563;**
455/575[58] **Field of Search** 455/412, 413,
455/414, 466, 550, 552, 553, 556, 557,
575, 566, 558, 563

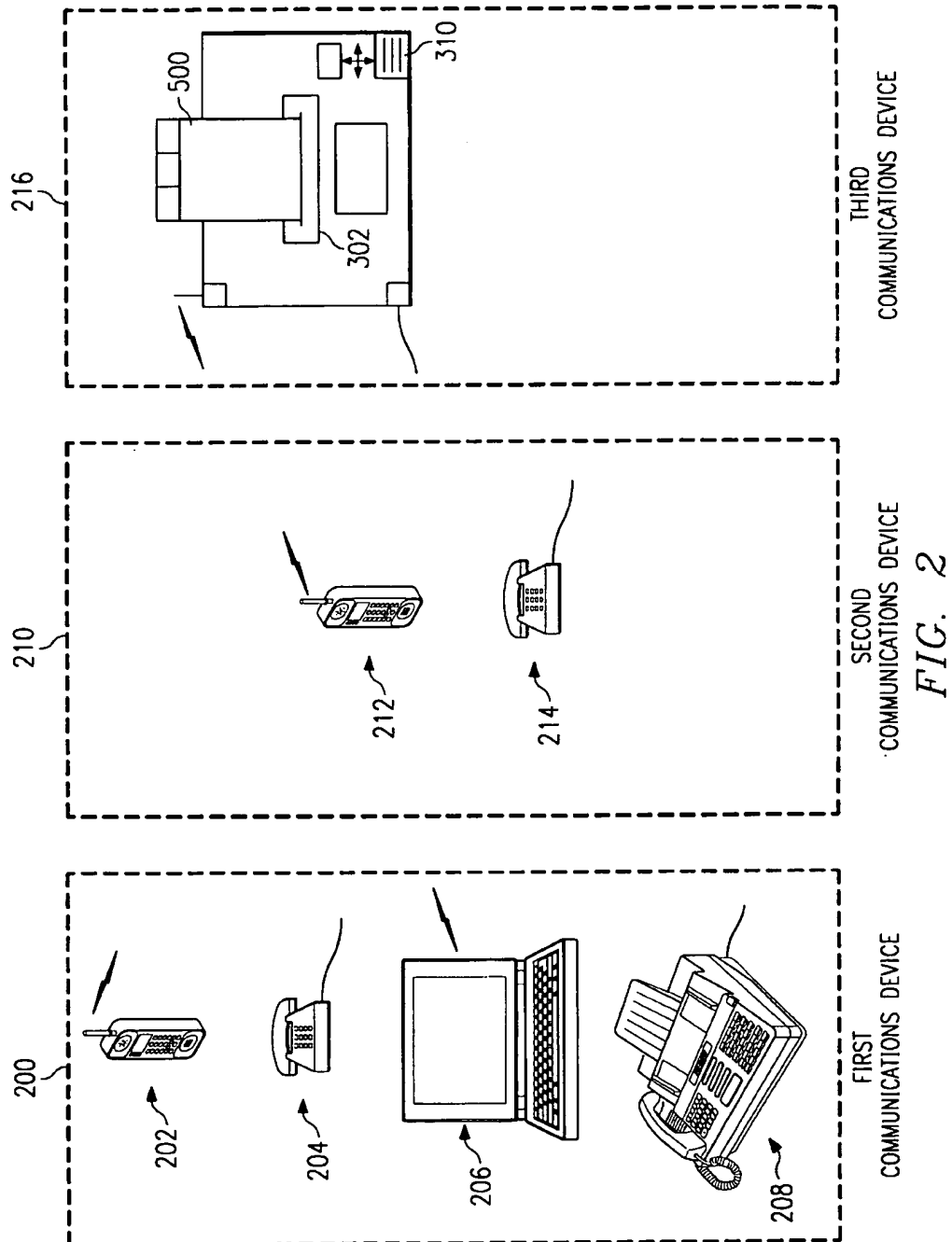
An apparatus which is capable of facilitating wireless and wireline communication with a multitude of wireless and wireline devices. The apparatus includes the necessary functionality to receive, record, process, and output incoming wireless and/or wireline voice, text, data, and multi-media messages. These messages can be outputted instantly or later to voice and/or to paper, based on a users input and preference. The user has many commands and options from which to choose when processing the messages. These choices will provide the user with more flexibility in determining how and when incoming communications can and should be processed.

[56] **References Cited****U.S. PATENT DOCUMENTS**

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2 Claims, 5 Drawing Sheets





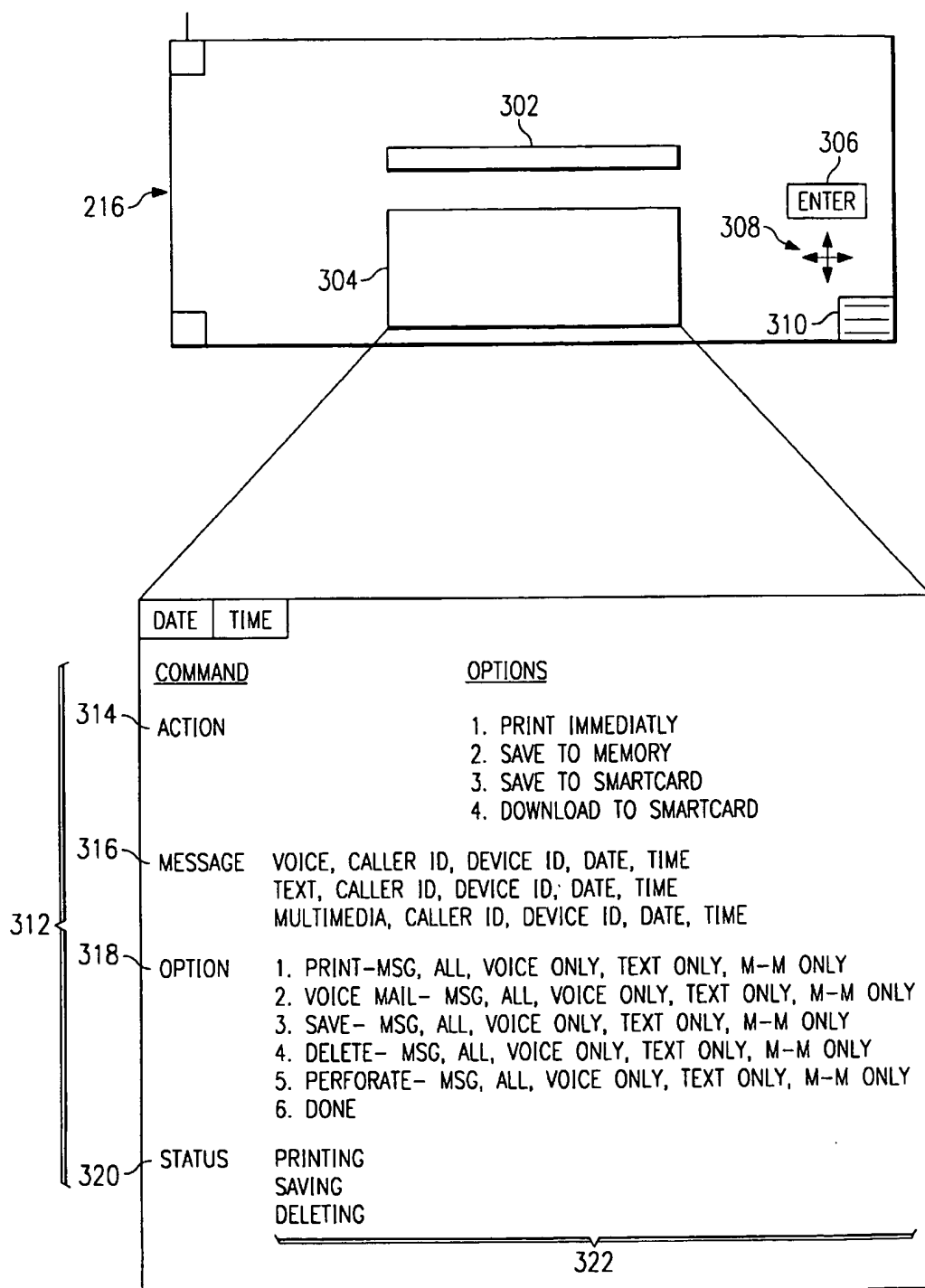


FIG. 3

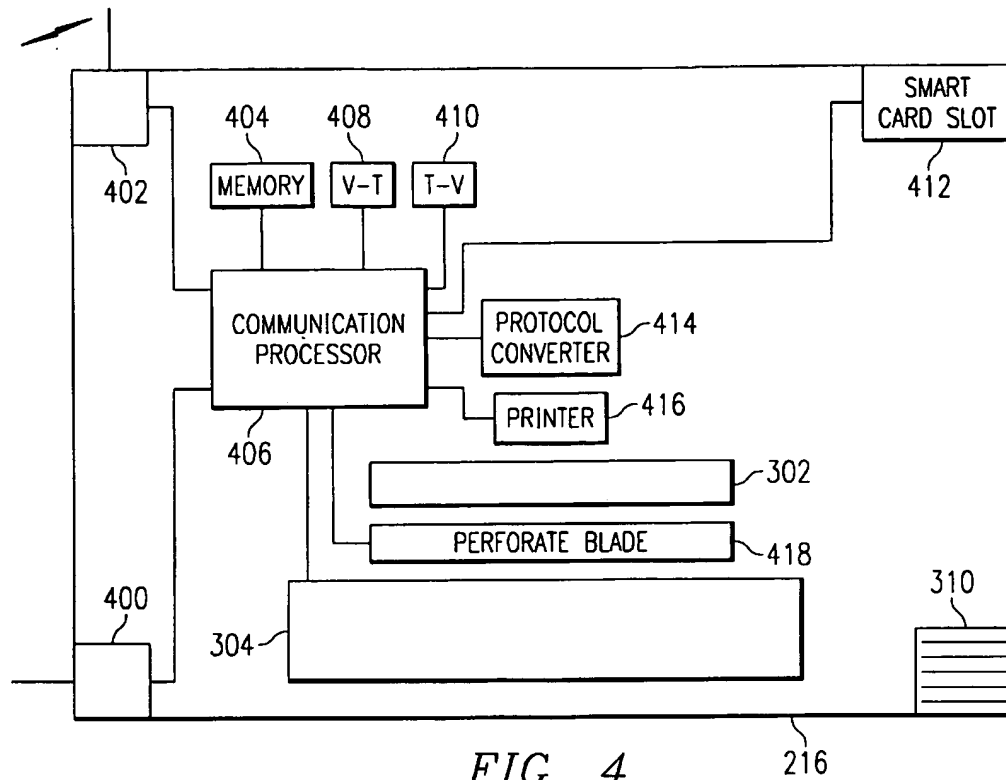


FIG. 4

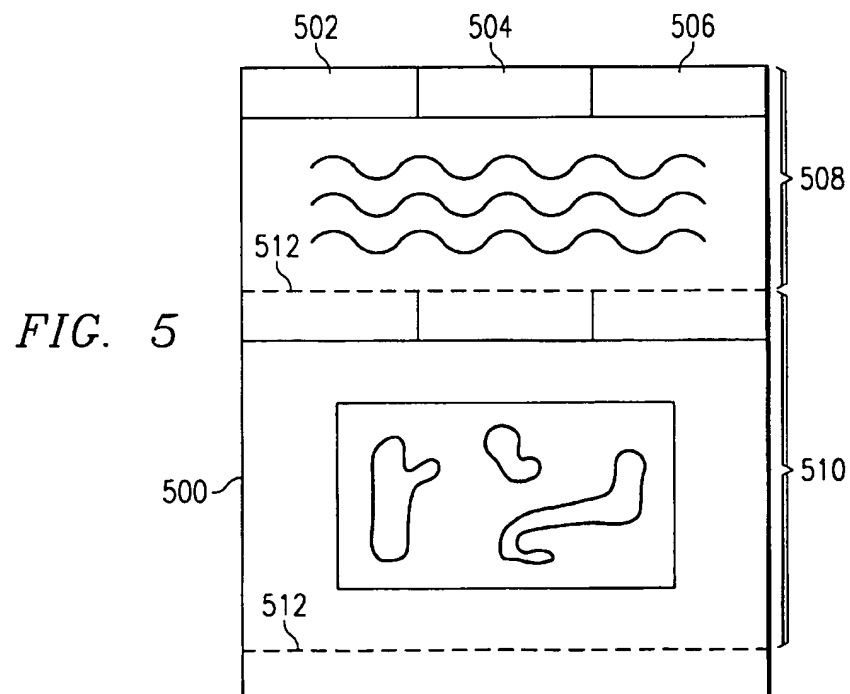


FIG. 5

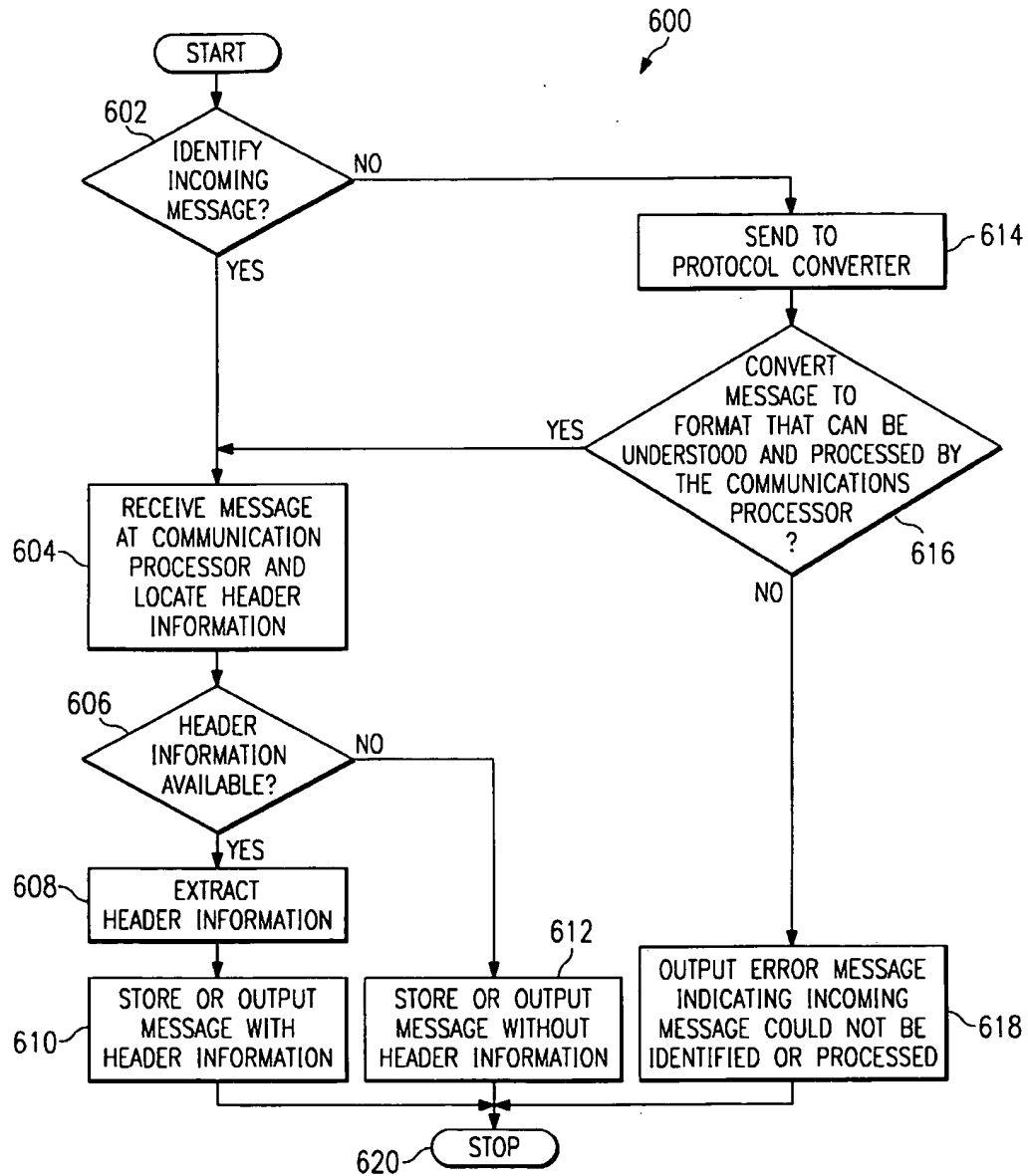


FIG. 6

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METHOD AND APPARATUS FOR PROCESSING MULTIPLE TYPES OF INCOMING COMMUNICATION

TECHNICAL FIELD OF THE INVENTION

This invention relates generally to telecommunications and more particularly to a method and apparatus for processing multiple types of incoming wireless, wireline, fixed-wireless, satellite, and hybrid communications. Further, this invention relates to a method and apparatus of an enhanced answering machine.

BACKGROUND OF THE INVENTION

A traditional answering machine serves the important function of being able to record a voice message that can be played back and listened to at a later time. This type of answering machine has been very popular and enjoys a ubiquitous presence in most homes and businesses.

The traditional answering machine, however, is limited in its ability to output a received message in a different medium other than voice. The user has no other option to receive a message in a different medium such as text. Additionally, a user must be present at the answering machine (or another phone accessing the answering machine) in order to retrieve the message. This ties up the users communication equipment and may hinder other types of incoming and outgoing communications. There is also a capacity cost that is incurred within the answering machine and telecommunications network because messages must be stored in the answering machine which depletes available memory and then must be retrieved utilizing phone lines or air spectrum. These capacity costs diminish the potential for other types of communications to occur. Lastly, the user must engage the answering machine to initiate the process of retrieving the message.

Therefore, what is needed is a device that can work in conjunction with various communication devices that will provide the user with various options in which to receive messages over various mediums in a format specified by the user without the user having to engage the device.

SUMMARY OF THE INVENTION

The apparatus of the present invention, accordingly, includes the necessary functionality to receive, process, and output incoming wireless and/or wireline voice, text, data, or multi-media messages that can be outputted instantly or later to voice and/or to paper, based on the users input and preference. These choices will provide the user with more flexibility in determining how and when incoming communications should be processed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a flow diagram that illustrates the transferring of an incoming message to the apparatus of the present invention.

FIG. 2 is an isometric view of the apparatus of the present invention.

FIG. 3 illustrates the commands and options available to the user to process messages that are received at the apparatus in FIG. 1.

FIG. 4 is a block diagram of the apparatus in FIG. 1 and FIG. 2.

FIG. 5 illustrates the possible formatted paper output of the received messages.

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FIG. 6 is a flow diagram that illustrates the handling of an incoming message in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the transferring of an incoming message to the apparatus of the present invention is referred to, in general, by the reference numeral 100. In step 102, a message is initially sent from a first communications device to a second communications device. The message sent from the first communications device to the second communications device can be a data, text, or multi-media message. The first communications device, second communications device and apparatus will be described in greater detail herein. In step 104, the message is received at the second communications device where the message is either forwarded or "rolled-over" to the apparatus as shown in steps 106 and 110, or the message is processed at the second communications device as shown in steps 106 and 108. If the option to forward or "roll-over" the message to the apparatus is chosen, the message will be transmitted to and received at the apparatus as shown in steps 110 and 112 respectively. As shown in steps 114 and 116, the message is then converted into a format based on a users input before it is output by the apparatus. The act of processing information in this invention, relates to the apparatus acting on a message in a manner specified by a users input. For example, if the users wishes to print all messages, inputting this desired action will cause the apparatus to print all messages. The method for user input, choices for input, processing means, conversion means, and format choices will be described in greater detail herein.

Referring to FIG. 2, the apparatus of the present invention is referred to, in general, by the reference numeral 216. Apparatus 216, which is also referred to as a Third Communications Device 216, works in conjunction with a plurality of Second Communications Devices 210. These devices 210 may include one or more wireless terminal ((phone, pager, Personal Digital Assistant (PDA), computer, etc.)) 212, or wireline terminal 214. A Second Communications Device 210 initially receives a message from a First Communications Device 200. These devices 200 similarly may include one or more wireless terminal 202, wireline terminal 204, and may additionally include one or more computer 206, or facsimile machine 208.

When a user of a First Communications Device 200 initiates a communication to a user of a Second Communications Device 210, the user of the Second Communications Device 210 can either choose to immediately receive the incoming communications or have the incoming communications forwarded to the apparatus 216. If the user of the Second Communications Device 210 wishes to receive the incoming information as soon as it is transmitted, he or she may do so by ensuring the Second Communications Device 210 is not forwarded to the apparatus 216. If, however, the user wishes to have the information forwarded to the apparatus 216, he or she may either forward the information from the Second Communications Device 210 to the apparatus 216, or just not answer the incoming communications and have the incoming communications "roll-over" to the apparatus 216 after a predetermined number of "rings" at the Second Communications Device 210. The steps required to forward information or have incoming communications "roll-over" to an apparatus are well known to those with skill in the data processing art and, therefore, will not be described in greater detail herein.

Apparatus 216 works in conjunction with at least one Second Communications Device 210 and is able to receive

information from the Second Communications Device 210. When the information is received, it can be immediately outputted to paper 500 via a printer 416 through an open slot 302 of the apparatus 216. The information can also be stored in memory and outputted at a latter time either to paper 500 (via the printer 416) or, voice (via a transceiver 310). The paper, printer, open slot, and transceiver will be described in greater detail herein. The apparatus 216 can also be operably coupled to more than one wireless terminal 212 or wireline terminal 214.

The information that can be received and output to paper or voice by the apparatus 216 includes voice, text, data, or multi-media. In one example, text or data may be sent from any First Communications Device 200 to the wireless terminal 212 or wireline terminal 214 of the Second Communications Device 210. This can occur via a wireless data protocol ((Cellular Digital Packet Data (CDPD), Short Message Service (SMS), etc.)) for the wireless terminal 202, via email and internet for the wireline terminal 204 and computer 206, and via Group 3, Fax for the facsimile machine 208. In another example, voice may be sent from at least one First Communications Device 200 to the wireless terminal 212 or wireline terminal 214 of the Second Communications Device 210. This can occur via a wireless air protocol ((including Advanced Mobile Phone Service (AMPS), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Global System for Mobile Communications (GSM), etc.)) for the wireless terminal 202 or via a wireline protocol ((Primary Rate Interface (PRI), Basic Rate Interface (BRI), Integrated Services Digital Network (ISDN), Signaling System 7 (SS7), etc.)) for the wireline terminal 204.

In yet another example, multi-media information can be sent from any First Communications Device 200 to the wireless terminal 212 or wireline terminal 214 of the Second Communications Device 210 if the devices sending and receiving information were internet or web compliant devices. Thus, when the apparatus 216 receives this voice, data, text, or multi-media information, it can output it to either paper or voice. In this scenario, the apparatus is acting as an enhanced answering machine.

Referring to FIG. 3, the user can control the type and order of messages to be output by navigating through various commands 312 and options 322 that are displayed on the screen 304 via the arrow keys 308 and the enter key 306. The arrow keys 308 are a device utilized to move a cursor and highlight different choices on the screen 304. The user would pick the available choices by using the up and down arrow keys 308 to navigate through the commands 312 and the left and right arrow keys 308 to navigate through the options 322. When a highlighted command 312 or option 322 is wanted, the user simply presses the enter key 306 to activate that command or option. In addition to the various commands 312 and options 322 that are displayed on the screen 304, the current date and time are also shown.

Additional forms and examples of processing now follows. There are four available commands 312 including: action 314, message 316, option 318, and status 320. The action command 314 has four associated options 322 including: print immediately, save to memory, save to smart card, and download from smart card. The message command 316 has three associated options 322 including: the voice message and header information, the text message and header information, and the multi-media message and the header information. The header information contains the caller I.D., device I.D., date of delivery of the message, and time of delivery of the message. The option command 318 has six

associated options including the options to print, play voice mail, save, delete, and perforate a particular message, all messages, voice messages only, text messages only, or multi-media messages only. The last option available is the done option which indicates the user has concluded inputting his or her options. Finally, the status command 320 has three associated options including printing, saving, and deleting.

Additionally, the user can choose more than one command 312 or option 322 to be activated. For example, if the user wanted to immediately print all incoming communications to paper, the print immediately option under the action command 314, the print all option under the options command 318, and the done option under the options command 318 would be chosen.

Referring to FIG. 4, the apparatus 216 is able to receive information from a Second Communications Device 210 (not shown) either via a wireline communications interface 400 which can be accessed via an RS-232 cable, or similar device suitable for receiving communications over a wire or group of wires, or a via wireless communications interface 402 which can be accessed by a number of air protocols. The wireless communication interface 402 is a smart antenna that is able to accept different wireless protocols over different frequencies. These interfaces 400 and 402 can support many types of incoming messages including voice, text, facsimile, data, or multi-media.

Incoming information is sent from the communication interfaces 400 and 402 to the communication processor 406. The communication processor 406, which is operably coupled to the communication interfaces 400 and 402, receives the incoming information and checks the message for header information. This header information includes the caller I.D. (which includes the callers name and number), time of the transmission, date of the transmission, and the identity of the device originating the transmission. The communication processor 406 is also operably coupled to printer 416 and memory 404, allowing the communication processor 406 to output a received message. If a user chooses, the header information and content of the message can be directly printed on paper when received at the communication processor 406 via the printer 416, the paper being expelled through the open slot 302. Alternatively, the message can be first stored in memory 404 before being outputted at some later time. In this situation, the header information and content of the message can be retrieved from memory 404 by the communication processor 406 and either outputted to voice via the transceiver 310, printed on paper via the printer 416, or both.

The apparatus 216 also contains a voice-to-text converter 408, a text-to-voice converter 410, a protocol converter 414, a smart card slot 412, and a perforation blade 418 which are all operably coupled to the communication processor 406.

Through the voice-to-text converter 408 and the text-to-voice converter 410, the user has the option of converting received messages to text, voice, or both. If the apparatus 216 received a voice message and the user indicated all messages were to be printed to paper, the voice message would be routed to the voice-to-text converter 408 by the communication processor 406. The voice-to-text converter 408 would convert the voice message into a text message and send that text message back to the communication processor 406. The communication processor 406 would then send the text message to the printer to be printed out. The text-to-voice converter 410 would work in a similar manner except a text message would be converted into a

voice message and output via the transceiver 310. The user is now able to receive all of their messages in the form they prefer.

If the communication processor 406 receives an incoming wireless message that is submitted over a different protocol than the communication processor 406 can understand or process, it is sent to the protocol converter 414. The protocol converter 414 takes incoming messages and converts them into a format that can be understood and processed by the communication processor 406. For example, if the wireless communication interface 402 were designed to receive CDMA protocol messages and a GSM wireless message is received by the wireless communication interface 402, the GSM message is forwarded to the communication processor 406. The communication processor 406 would not understand the GSM message and would forward it to the protocol converter 414. The protocol converter 414 would then take the relevant information from the fields of the GSM message and put them into appropriate fields of a CDMA message. There will not be a perfect mapping of messages from one wireless protocol to another based on the inherent differences with message length and content. Vital information, however, which is common to all messages, will be converted into the appropriate message format and sent back to the communication processor 406 for processing.

A smart card slot 412, which is able to receive a smart card (not shown), is also operably coupled to the communication processor 406. The smart card can download or upload text, data, voice or multi-media messages. A smart card, in this context, is plastic and the size of a credit card but has one or several microprocessors embedded in the plastic substrate and flush with the surface of the card. The microprocessor contains memory, protection and reset circuits, a clock, and an I/O (input/output) area, and acts as a contact that allows the transfer of information to and from the card. The smart card also has several kilobits of permanent (rewritable or nonrewritable) memory that can store information. The smart card slot 412 includes a contact that is able to send and retrieve information to and from the smart card contact when the smart card is entered into the smart card slot 412. The communication processor 406 handles the flow of information between the apparatus 216 and the smart card based on a users input. For example, the user, via the screen 304, can choose the action command 314 and one of the smart card options. If a user is initially receiving messages on a wireless terminal that is able to house a smart card, these messages, and others that the user may compile, are stored on the smart card. That smart card may then be taken out of the wireless terminal and placed in the smart card slot 412 of the apparatus 216. The various messages on the smart card can then be downloaded to the communication processor 406 by choosing the download from smart card option. The smart card can then be left in the smart card slot 216 while incoming messages are received at the communication processor 406. The smart card can then store these messages with the save to smart card command. The smart card can then be placed in a users wireless device (as can currently be done in GSM phones) and the messages can be outputted through the wireless device at the users convenience.

Referring to FIG. 5, when the incoming information is outputted to paper 500, the callers I.D. (name and/or number) is placed in field 502, the time and date of the message transmission to the apparatus 216 is placed in field 504 and the identity of the First Communications Device 200 sending the message to the apparatus 216 is placed in field 506. It can also be seen that when a text message 508

or multi-media message 510 has ended and all of the information for a message has been recorded, a perforation 512 is made before a new message is processed.

A perforation blade 418 (as shown in FIG. 4) is able to perforate the paper 500 after a message has been printed. If the perforate option is chosen (under the options command 318), the communication processor 406 identifies the perforation blade 418 when a message has completed printing. At that time, the perforation blade 418 makes a perforation in the paper. This makes it easier to locate different outputted messages and makes it possible to tear and distribute these messages to various individuals.

Referring to FIG. 6, a flow diagram 600 illustrates the handling of an incoming message. If the incoming message can be identified 602 by the communication processor 406, it is processed at the communication processor 406 where the header information is searched for 604. If the header information is available 606, it is extracted 608 and then stored or outputted with the message 610. If the header information is not available 606, only the message is stored or outputted 612. If the incoming message cannot be identified 602, the message is sent to the protocol converter 614 where it is converted into a format that can be identified and processed by the communication processor 406. If the incoming message can be converted 616, it is sent to the communications processor 406 where the header information is searched for 604. If the incoming message cannot be converted 616, an error message is stored or outputted that indicates the incoming message could not be identified 618. After any of these three scenarios have occurred, the apparatus will stop processing the incoming message 620 until another incoming message is received.

It is understood that variations may be made in the foregoing without departing from the scope of the invention. For example, the second communications device 210 and the third communications device 216 of FIG. 2 can be integrated into a common communications device that provides the user with the additional ability to make and receive calls with a common device.

In view of the above detailed description and associated drawings, the advantages of this method and apparatus for processing multiple types of incoming wireless and wireline communications should be apparent to those skilled in the art. Additionally, modifications and variations will now become apparent to those skilled in the art such that other modifications and variations may be effected without departing from the spirit and scope of the present invention as set forth in the claims which follow.

What is claimed is:

1. A telecommunication device capable of receiving multiple types of incoming messages comprising, in combination:

- a communication interface for receiving incoming messages in the form of voice, text, data or multimedia messages;
- a communication processor coupled to the communication interface for receiving and processing each received message;
- a memory coupled to the communication processor for storing processed messages;
- means for entering a desired action for each type of incoming message including immediate or delayed output thereof and including unchanged or format changed output thereof;

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a voice to text converter disposed between the communication processor and the memory to convert incoming voice messages to text when such desired action has been entered;

a text to voice converter disposed between the communication processor and the memory to convert incoming text messages to voice when such desired action has been entered; and

a plurality of output devices coupled to the communications processor, the memory and the entering means to output the processed message based on user input

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wherein the output may be immediate or delayed in time and may be in the same or different format from the message originally received.

2. The telecommunication device of claim 1 additionally including a protocol converter for converting the incoming message from the interface in one of a plurality of communication protocols to a message with a single protocol understandable by the communication processor.

* * * * *



US005310128A

United States Patent [19][11] **Patent Number:** **5,310,128****Doeberl et al.**[45] **Date of Patent:** **May 10, 1994**[54] **TAPE STORAGE APPARATUS FOR MAILING MACHINE**[75] **Inventors:** Terrence M. Doeberl, West Redding; Joseph Gelb, Jr., Milford, both of Conn.[73] **Assignee:** Pitney Bowes Inc., Stamford, Conn.[21] **Appl. No.:** 14,917[22] **Filed:** Feb. 8, 1993[51] **Int. Cl.⁵** B65H 35/04[52] **U.S. Cl.** 242/55; 226/91; 400/613; 400/692; 83/649[58] **Field of Search** 242/55, 58.6; 226/91, 226/92; 400/205.1, 692, 613; 83/649[56] **References Cited****U.S. PATENT DOCUMENTS**

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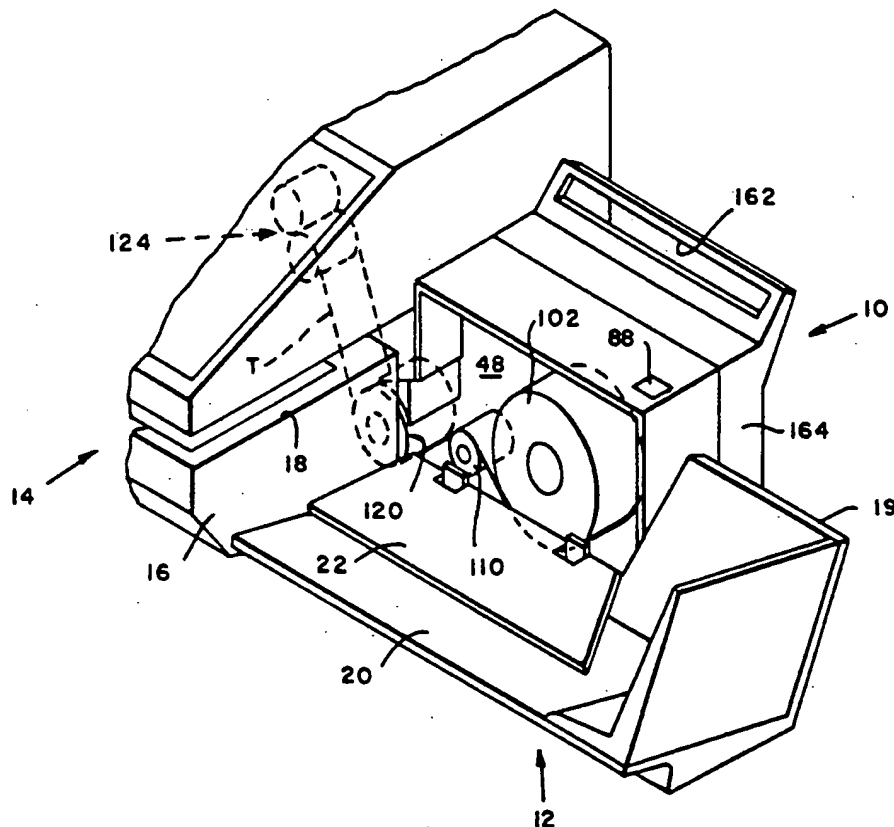
0142658 6/1987 Japan 400/692

Primary Examiner—Daniel P. Stodola*Assistant Examiner*—Paul T. Bowen*Attorney, Agent, or Firm*—Charles G. Parks, Jr.; Melvin J. Scolnick

[57]

ABSTRACT

A tape storage apparatus is used with a mailing machine having printing postage indicia on a discrete portion of a strip of tape of indefinite length which is fed along a tape path extending through the mailing machine by a tape feeding device mounted within the mailing machine. The tape storage apparatus includes a base having vertical guide rails and a tape holding device mounted on the guide rails for movement therealong. A releasable latch holds the tape holding device in a lowermost position against the force of a plurality of resilient spring device for moving the tape holding device upwardly to a position in which the tape holding device becomes accessible to an operator or service person for reloading rolls of tape or performing service on the apparatus. When the tape holding device is in its lowermost position, it is functionally integrated with the mailing machine, but it is inaccessible for reloading tape or for threading tape into the feeding device in the mailing machine.

12 Claims, 7 Drawing Sheets

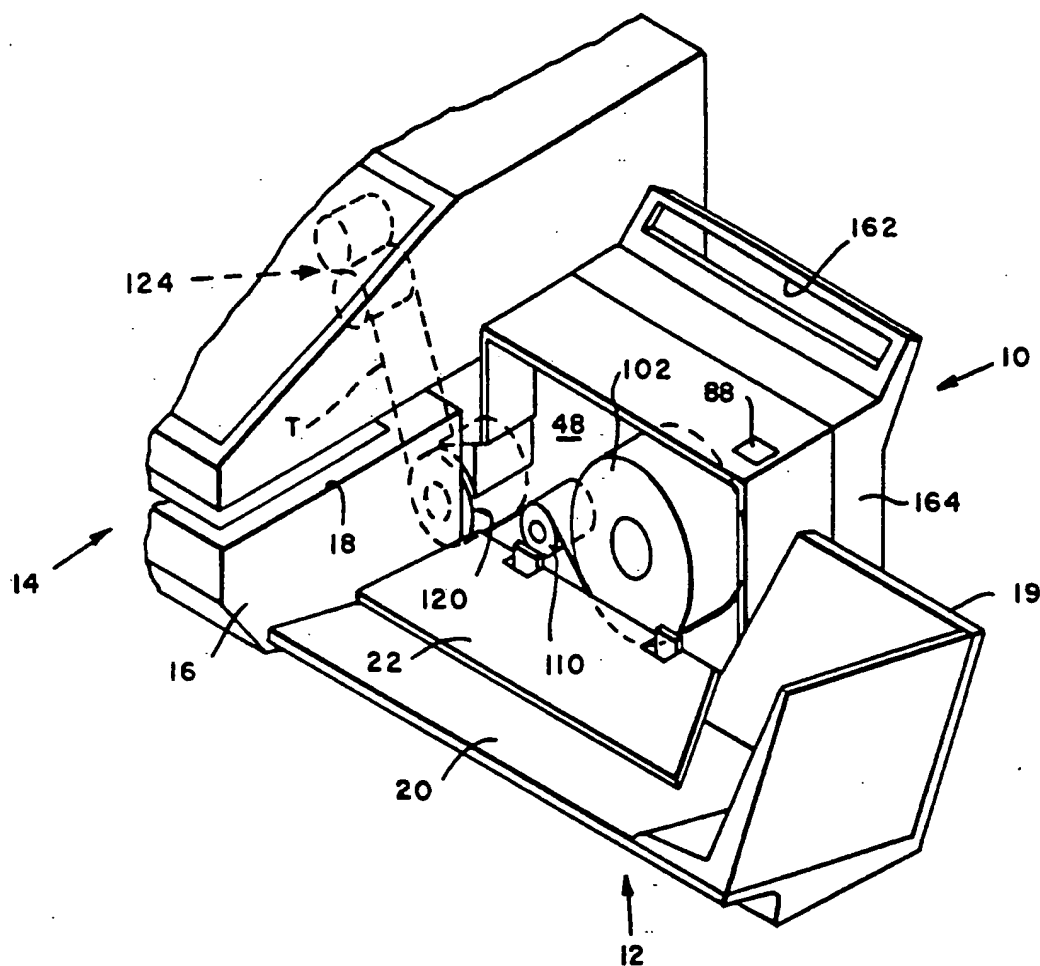


FIG. 1

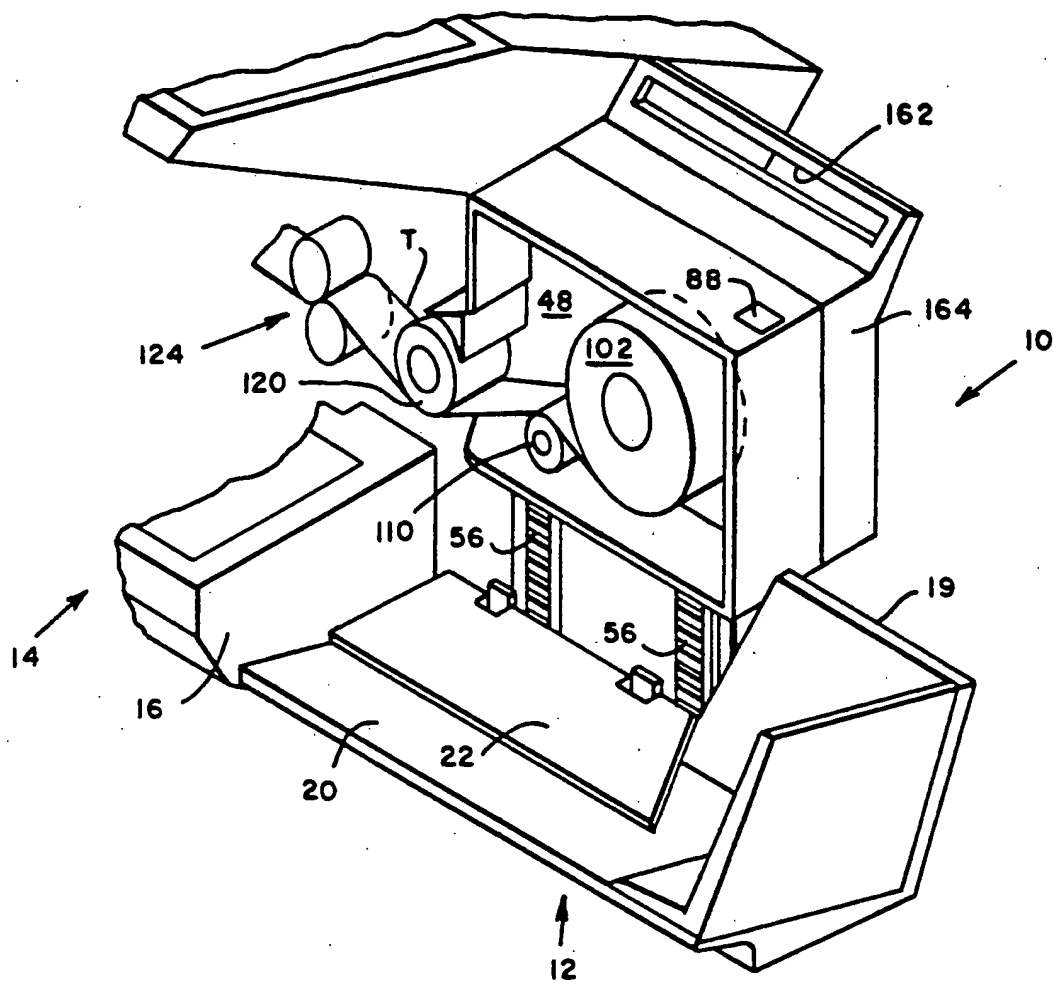


FIG. 2

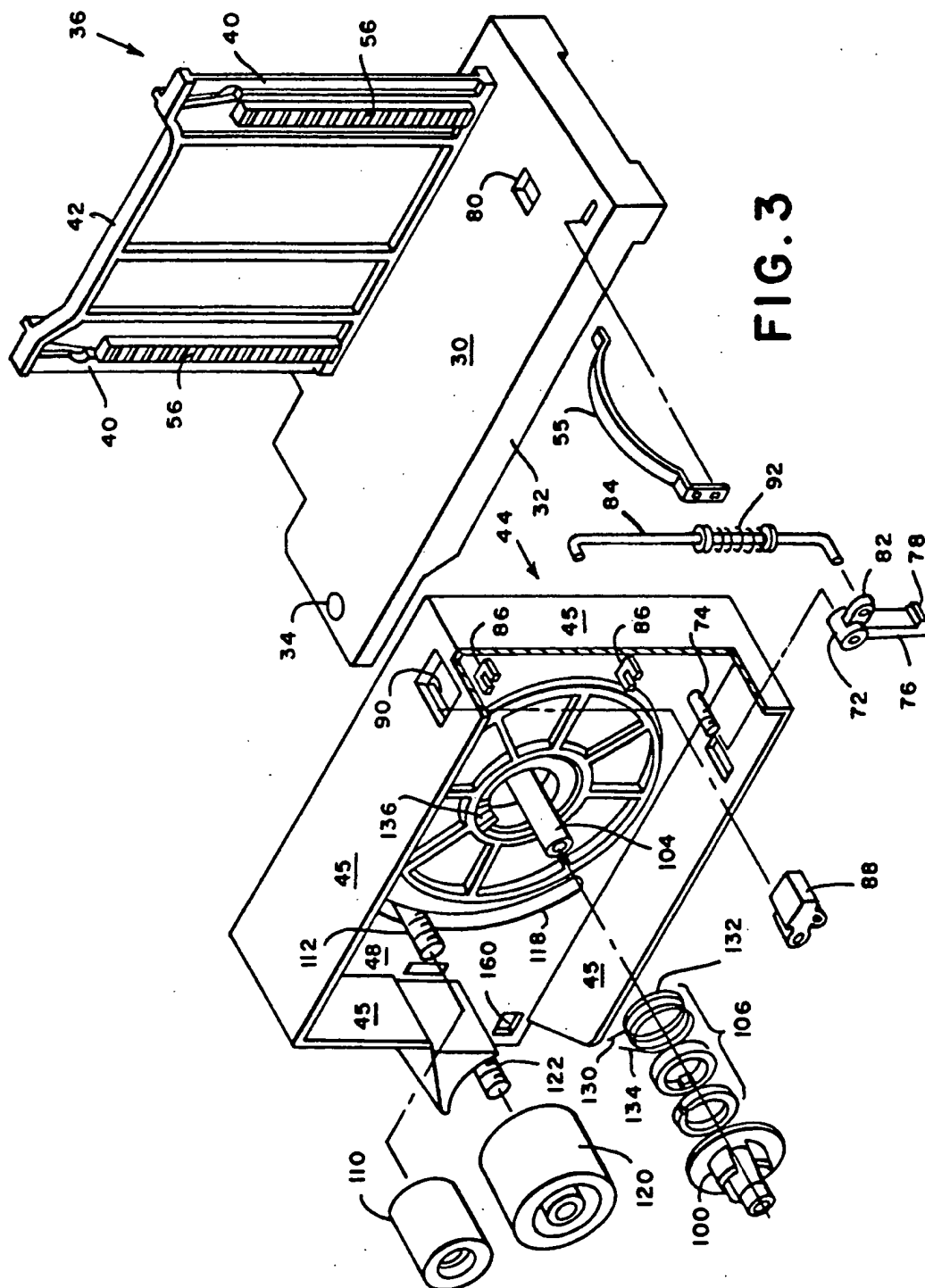
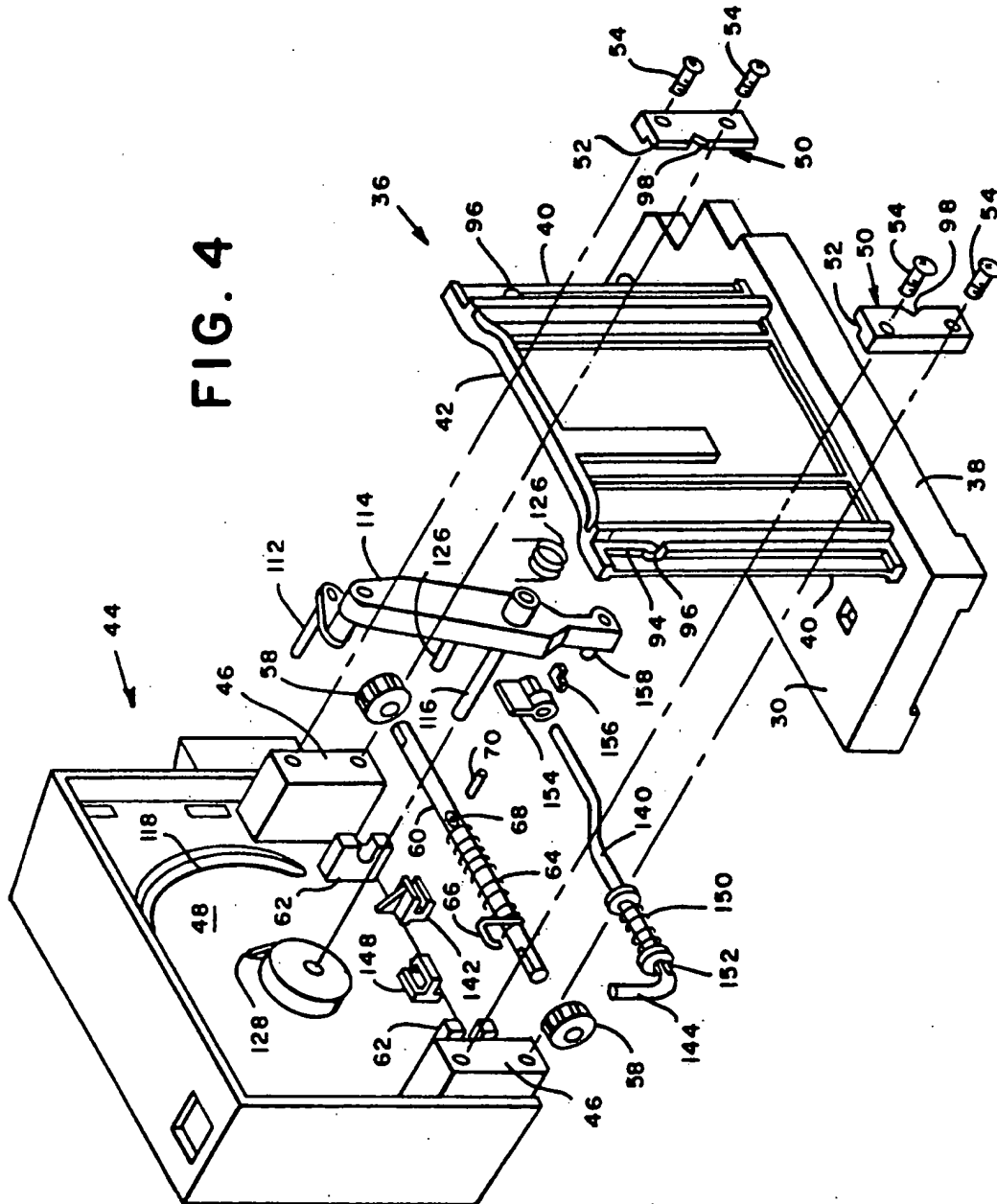


FIG. 4



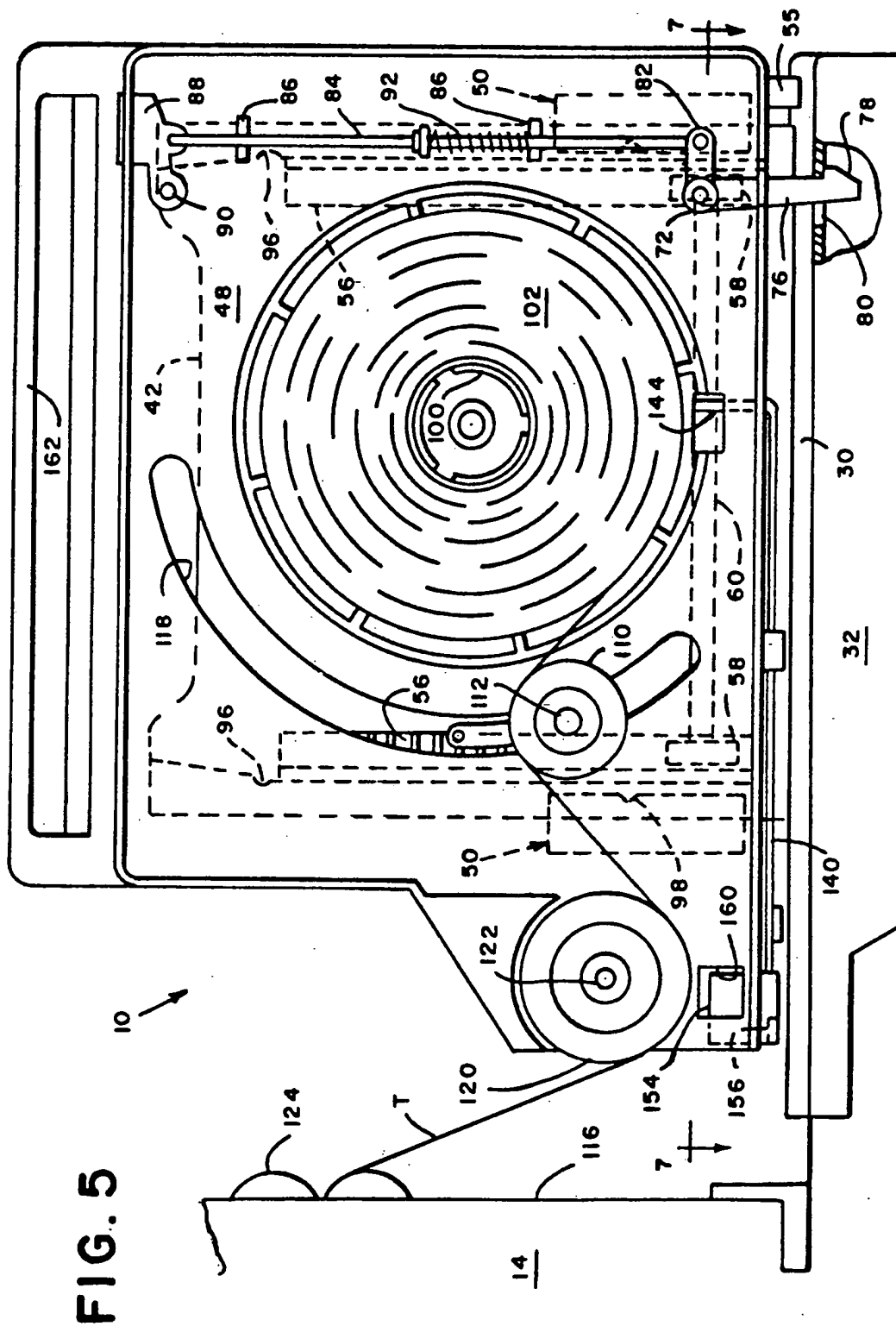


FIG. 6

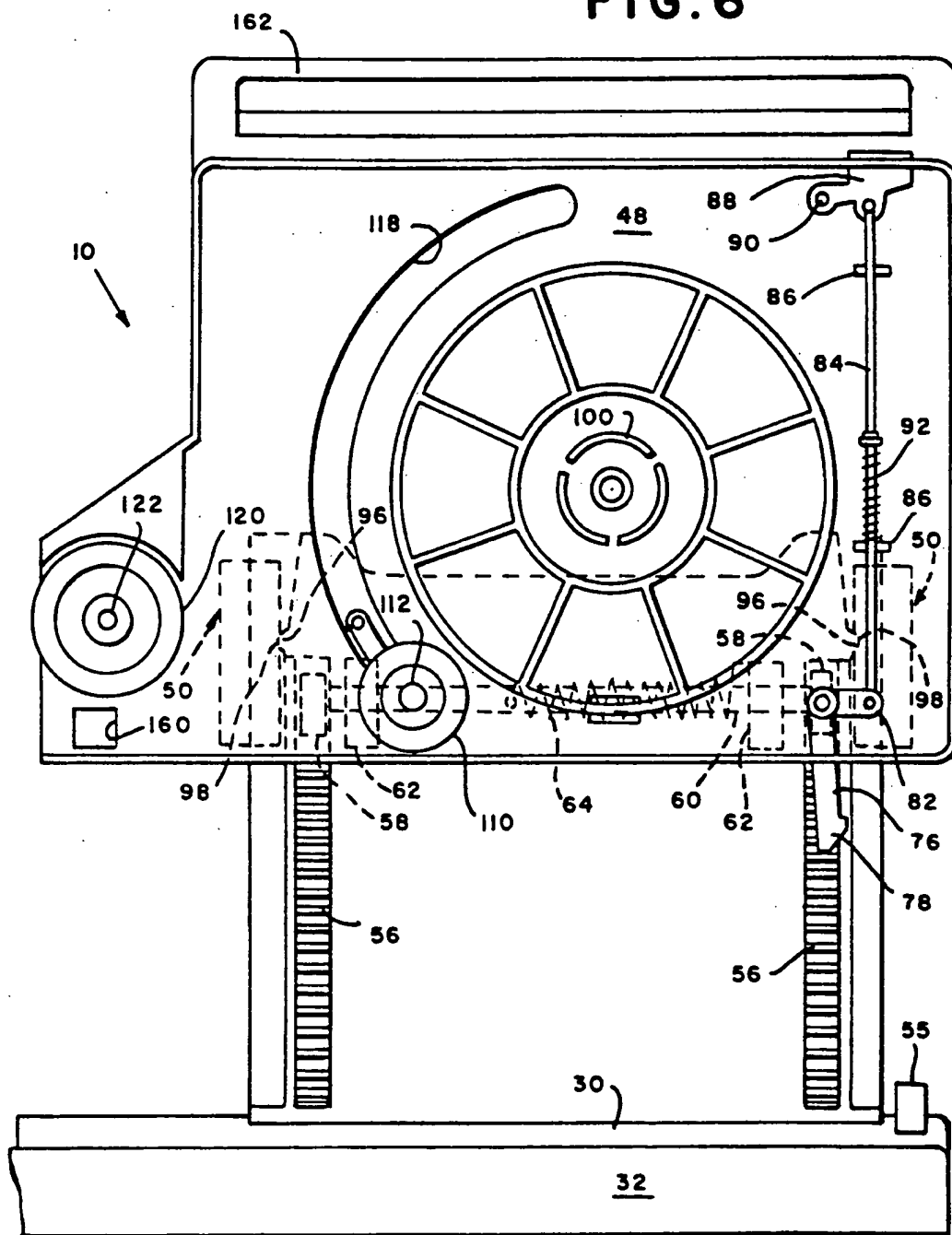
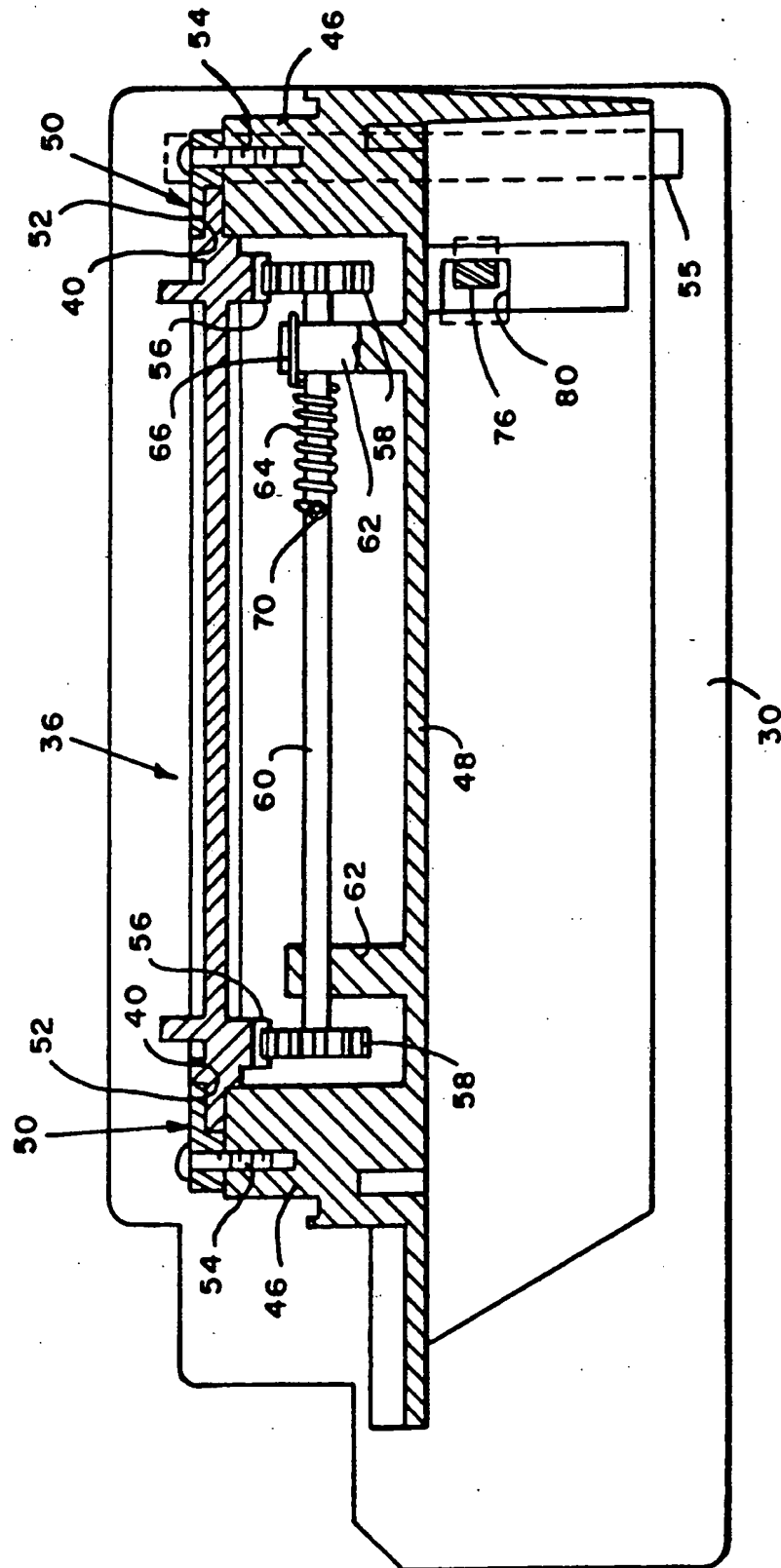


FIG. 7



TAPE STORAGE APPARATUS FOR MAILING MACHINE

CROSS REFERENCE TO OTHER PATENTS AND APPLICATIONS

The following discloses a mailing machine with which the present invention can be utilized: U.S. Pat. No. 4,876,956 for REMOVABLE POSTAGE METER HAVING AN INDICIA COVER, assigned to the assignee of this application.

The following disclose a tape tensioning apparatus related to the present invention: U.S. Pat. No. 4,922,085 for MAILING MACHINE TAPE MODULE AND TAPE DRIVE THEREOF; No. 5,007,370 for MAILING MACHINE TAPE MODULE AND TAPE TAKE-UP AND MOISTENING SYSTEM THEREOF; and U.S. Pat. No. 5,016,511 for TAPE CUTTER, all assigned to the assignee of this application.

The following disclose a wrap spring clutch assembly related to this application: U.S. patent application Ser. No. 685,783 for MAILING MACHINE ROLL TAPE DISPENSING APPARATUS; and Ser. No. 08/014,727, filed concurrently herewith, for WRAP SPRING CLUTCH ASSEMBLY, both assigned to the assignee of this application.

BACKGROUND OF THE INVENTION

The present invention relates generally to an apparatus for storing tape which is fed to a printing apparatus, and more particularly to a tape storage apparatus for use in a mailing machine in which tape is selectively moved to and from a printing position in which postage indicia is printed on the tape when the mailing machine is not printing the postage indicia on discrete envelopes.

Modern day mailing machines, such as that shown and described in the aforementioned U.S. Pat. Nos. 4,876,956 and 4,922,085 have evolved into highly, multi-functional machines capable of processing a plurality of mail pieces of different types through the steps required to affix proper postage to them for handling by the U.S. Postal Service. For example, the mailing machine just mentioned can store a plurality of mail pieces in a hopper, successively feed them seriatim to a weighing module which electronically determines the amount or postage required for each mail piece, print that amount of postage as an indicia either directly on the mail piece if it is relatively thin, such as a typical letter envelope or on a strip of tape which is applied to the envelope if it is too thick to feed through the printing mechanism, and finally deposit mail pieces in an orderly fashion in any of a variety of stacking devices for retrieval and further handling by Postal Service representatives. It should also be noted that the foregoing process occurs at a high rate of speed, usually in the order of 2 per second if weighing each piece is involved, 4 per second if weighing is not involved. Thus, it will be apparent that to accomplish this process at the indicated speed, the mailing machine requires a great number of mechanical parts which must fit together accurately and operate smoothly, and a highly complex electronic control system including various operator controlled devices and modules for setting up and operating the mailing machine, microprocessors for controlling the synchronous operation of various components and de-

vices, and diagnostic systems for detecting various malfunctions and providing appropriate indication thereof.

One of the requirements of the mailing machine under consideration is that of providing a continuous supply of tape on which the postage indicia is printed when tape printing is the selected mode of operation. Since the mailing machine operates at a high rate of speed in terms of the number of mail pieces processed as mentioned above, it is necessary to have a large supply of tape available in order to minimize the down time of the mailing machine which would otherwise be required if rolls of tape had to be replaced frequently. In addition, in order for the tape feed mechanism of the mailing machine to function smoothly and properly at a high rate of speed, it is necessary to have a tape storage mechanism which incorporates devices, controls and features for physically storing a large quantity of tape, for maintaining proper tension on the tape during intermittent feeding operations, for detecting when the tape becomes exhausted, for providing proper indication when this occurs, and being mounted in such a manner that it is structurally integrated into the mailing machine for maximum functionality and yet is conveniently accessible to machine operators or service personnel for their respective needs.

In the course of the design and development of the mailing machine with which the present invention was intended for use, many different design concepts were considered for an apparatus which would provide all of the functional requirements mentioned above. All of those considered provided some of these requirements with varying degrees of success, but each failed in one or more respects to meet the design criteria specified. For example, one design called for the tape storage apparatus to swing upwardly on an arc about a pivot point, but this resulted in so much slack in the strip of tape between the roll in the storage device and the input point of the mailing machine that it was difficult to thread the lead edge of the tape into the mailing machine. Another solution was to use two rolls of tape mounted side by side in the tape storage apparatus, but this was considered wasteful, inefficient and added unnecessary complexity and cost to the apparatus.

One particular vexing problem was that of structurally integrating the tape storage apparatus into the mailing machine in a manner which achieved maximum functionality while at the same time maintaining the apparatus conveniently accessible to operators and service people. It was found that when the tape storage apparatus was located when it would function best with the mailing machine, it was virtually completely inaccessible for replacement of rolls of tape or other service; and if located to facilitate access, certain functional problems developed in connection with the smooth feeding of tape from the storage apparatus to the printing module of the mailing machine which were unacceptable, such as difficulty in threading tape into the mailing machine and jamming and tearing of the tape during operation. Thus, prior to the present invention, there was no completely satisfactory tape storage apparatus available for use with the subject mailing machine.

BRIEF SUMMARY OF THE INVENTION

The present invention overcomes the foregoing problems and has been found to provide all of the above mentioned functional requirements and to meet all of the design criteria to a large degree of satisfaction, and

has proven to provide highly acceptable solutions to numerous and often vexing problems.

The present invention is a tape storage apparatus for use with a mailing machine which prints postage indicia on a discrete portion of a strip of tape of indefinite length which is fed along a tape path extending through the mailing machine by tape feeding means mounted within the mailing machine. In its broader aspects, the tape storage apparatus includes a base which is adapted to be connected to the mailing machine adjacent to an entrance to the tape path extending through the mailing machine, a substantially vertically oriented guide member which extends upwardly from the base, and a tape holding means which holds a large roll of tape and defines a tape path extending from the point of unwinding of the tape from the roll to an exit location. The apparatus further includes means mounting the tape holding means for movement along the guide member between a lowermost operative position in which the tape holding means is inaccessible in the mailing machine for replacement of a roll of tape and for threading the tape along the tape path in the tape holding means and into the entrance to the tape path in the mailing machine, and an uppermost inoperative position in which the tape holding means becomes accessible for replacement of a roll of tape and for threading the tape as aforementioned. There is a releasable latching mechanism for normally holding the tape holding means in the lowermost position, and there is resilient means for urging the tape holding means upwardly when the latching means is released.

In some of its more limited aspects, the guide member includes a pair of spaced apart rails on which the tape holding means rides between the aforementioned positions, and the resilient means for raising the tape holding means comprises a first spring for quickly snapping the tape holding means away from the base for a short distance and a second spring for raising the tape holding means a substantial distance along the rails. This is accomplished by having the second spring, a torsion spring in the preferred embodiment, drive a shaft on which pinions are mounted which engage with racks on the guide member, the spring being wound so as to drive the tape holding means upwardly when the latching means is released.

The tape storage apparatus further includes a tape tensioning device for maintaining proper tension on the portion of tape which extends from the roll along the aforementioned tape path and into the tape feeding device of the mailing machine, the tensioning device including a wrap spring clutch which functions to prevent rotation of a roll of tape carried by the tape holding means from rotating in an unwinding direction when there is sufficient tape in the aforementioned tape path, and which is released by a tension sensing member to permit rotation of the roll of tape when normal slack in the tape in the tape path is taken up and additional tape is required.

The tensioning device is connected to a tape sensing device which both senses when the tape becomes exhausted and provides an appropriate indication of this condition. The tensioning device is also responsive to upward movement of the tape holding means to the aforementioned uppermost position to both release the wrap spring clutch to provide free rotation of the roll of tape and also to activate the out-of-tape sensing device.

Having briefly described the essential nature of the present invention, it is a general object thereof to pro-

vide a tape storage apparatus for a mailing machine which meets all of the design criteria established for the apparatus and which solves all of the problems of prior attempts at designing the subject apparatus.

Another object of the present invention is to provide a tape storage apparatus for a mailing machine which is structurally integrated into the mailing machine to provide maximum functionality and yet is conveniently accessible to operators or service personnel for their respective needs when required. A further object of the present invention is to provide a tape storage apparatus for a mailing machine which is capable of holding a large quantity of tape to minimize the down time of the mailing machine otherwise required during replacement of exhausted tape rolls.

A still further object of the present invention is to provide a tape storage apparatus for a mailing machine which includes a device for maintaining proper tension on the portion of the tape between the roll of tape in the tape storage device and the input feed mechanism of the mailing machine. Another object of the present invention is to provide a tape storage apparatus for a mailing machine which includes a device for detecting when the roll of tape is exhausted and for providing an appropriate indication when this occurs.

Still another object of the present invention is to provide a tape storage apparatus for a mailing machine which is rugged in construction, and simple enough to be loaded, operated and serviced by relatively inexperienced personnel. These and other objects and advantages of the present invention will become more apparent from an understanding of the following detailed description of a presently preferred embodiment of the invention when considered in conjunction with the accompanying drawings.

DESCRIPTION OF THE FIGURES

FIG. 1 is a fragmentary perspective view of the tape storage apparatus of the present invention as it appears when installed on the mailing machine for which it was designed and when disposed in the normal operative position;

FIG. 2 is a view similar to FIG. 1 but showing the tape storage apparatus disposed in the position it occupies when raised to the inoperative position for tape replacement and threading;

FIG. 3 is an exploded view of the front portion of the tape storage apparatus;

FIG. 4 is an exploded view of the rear portion of the tape storage apparatus;

FIG. 5 is a detailed front elevation of the tape storage apparatus when disposed in the normal operative position;

FIG. 6 is a view similar to FIG. 5 but showing the tape storage apparatus in the raised or inoperative position; and

FIG. 7 is a partial sectional plan view taken along the line 7-7 of FIG. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and particularly to FIGS. 1 and 2 thereof, the tape storage apparatus of the present invention is shown in association with the mailing machine with which it was intended for use. It should be understood that the mailing machine per se forms no part of the present invention and therefore only so much of the mailing machine is shown and

described in a fragmentary manner as is necessary to lend clarity to the environment in which the present invention is used.

The tape storage apparatus of the present invention is generally designated by the reference numeral 10. It is connected in a manner to be further described below just behind a suitable mail piece stacker, generally designated by the reference numeral 12, of which several types are available, but all of which serve the purpose of collecting and stacking mail pieces after they have passed through a mailing machine, generally designated by the reference numeral 14. Thus, the stacker 12 is suitably connected to an end wall 16 of the mailing machine 14 where a feed path extending through the mailing machine terminates, as indicated by the slot 18, from which the mail pieces exit after they have been weighed and an appropriate postage indicia printed thereon. The stacker 12, regardless of the type, typically includes an upstanding registration wall 19 connected to the platform 20 of the stacker 12 and which extends from the end wall 16 of the mailing machine 14 over the length of the platform 20. For a purpose described in more detail below, the registration wall 18 includes a flip-down door 22 suitably hinged to the registration wall 20 and which can be manually opened at will by an operator.

Referring now to FIGS. 1, 3 and 4, the tape storage apparatus 10 comprises a generally rectangular base 30 having a peripheral skirt 32 and a plurality of holes 34 through which the base 30 is suitably secured to the frame mailing machine 14 as by screws. A guide member, generally designated by the reference numeral 36, is either integrally formed with, or suitably mounted on, the base 30 adjacent a rear wall 38, the guide member 36 being substantially vertically oriented on the base 30. The guide member includes a pair of spaced apart guide rails 40 which extend upwardly from the base 30 substantially to the top 42 of the guide member.

As best seen in FIGS. 3 and 4, the tape storage apparatus includes a generally rectangular box-like housing, generally designated by the reference numeral 44, which includes top, bottom and side walls 45, and a pair of mounting blocks 46 suitably secured to the rear surface of a wall 48 which connects the side walls 45 together. A pair of suitably shaped securing bars 50, each having an undercut 52 formed in one surface thereof, are secured to the mounting blocks 46 by the screws 54 so that the outer faces of the mounting blocks 46 and the inner surface of the undercuts 52 of the securing bars cooperate with opposite surfaces respectively of the rails 40 (see FIG. 5) to permit the mounting blocks 46 and the housing 44 attached thereto to ride up and down on the rails 40 in the manner more fully described below.

The housing 44 is caused to move upwardly along the rails 40 by a pair of resilient spring drives, the first of which is merely an upwardly curved leaf spring 55 which is suitably secured to the base 30, and which is compressed between the upper surface of the base 30 and the lower surface of the bottom wall 45 of the housing 44 when the housing 44 is disposed in its lowermost position along the rails 40. When the housing 44 is released for movement by the releasable latching mechanism described below, the housing will move upwardly a short distance under the influence of the leaf spring 55.

The guide member 36 is provided with a pair of racks 56 which are located adjacent and parallel to the rails 40 and which extend from the base 30 almost to the top of

the guide member. A pair of pinions 58 are fixedly mounted on a shaft 60 which is rotatably mounted on the housing 44 as by the bearing blocks 62. A torsion spring 64, which constitutes a second spring drive, is wrapped around the shaft 62, and one end tang 66 of the spring is connected to the bearing block 62 and the other end 68 is connected to the shaft 60 as by the pin 70. As best seen in FIG. 7, when the housing 44 is connected to the guide member 26 in the manner described above, the pinions 58 mesh with the racks 56 in driving relationship and the shaft 60 is captured in the bearing blocks 62. The torsion spring 64 is tightly wound on the shaft 60 prior to assembly of the parts in such a manner that when the housing 44 is in its lowermost position, the torsion spring 64 is exerting a torque on the shaft 60 in a direction that will cause the pinions 58 to rotate in the same direction to cause them to move up the racks 56, thereby moving the entire housing upwardly along the racks 56.

As best seen in FIGS. 3 and 5, the housing 44 is normally maintained a lowermost position by a releasable latching mechanism which comprises a bell crank 72 pivotally mounted on a stub shaft 74 suitably secured to the front face of the wall 48. The bell crank 72 has a generally vertically extending arm 76 which terminates in a latch finger 78, which is adapted to pass through an aperture 80 formed in the base 30 when the housing 44 is in the lowermost position. As best seen in FIG. 5, the latch finger 78 catches on the underside of the base 30 and holds the housing 44 in the lowermost position. The bell crank 72 also has a generally horizontally extending arm 82 which is connected to the lower end of a rod 84 which extends upwardly through suitable guides 86 mounted on the front face of the wall 48 and is connected at its upper end to a push button 88 which is pivotally mounted on another stub shaft 90 suitably secured to the front face of the wall 48. A spring 92 is mounted on the rod 90 and is captured between the upper surface of the lower guide 86 and an abutment formed on the rod 84 so as to urge the rod 84 upwardly. This in turn maintains the latch finger 78 in engagement with the lower surface of the base 30 when the latching mechanism is engaged.

As best seen in FIGS. 4 and 6, there is another releasable latching mechanism for maintaining the housing 44 in its uppermost position on the guide member 36. Thus, the guide member 36 is provided with a pair of resilient fingers 94 which project downwardly from the top 42 of the guide member and which terminate in a protrusion 96. Each of the securing bars 50 has a detent 98 for engagement with the protrusion 96 so maintain the housing in its uppermost position. To release this latching mechanism, it is only necessary to push downwardly on the upper wall 45 of the housing with sufficient force to disengage the protrusions 96 from the detents 98.

The housing 44 is part of a tape holding means which is adapted to hold a roll of tape for feeding into the mailing machine in a manner more fully described below. Still referring to FIGS. 3 and 5, the tape holding means comprises a spool assembly 100 on which the roll of tape 102 is mounted, the spool assembly 100 being mounted on the shaft 104 projecting outwardly from the front surface of the wall 48. A wrap spring clutch 106 is interposed between the spool assembly 100 and the wall 48 of the housing 44 for preventing rotation of the spool assembly 100 when the housing 44 is in its uppermost position and also when a tape tensioning

means more fully described below senses an excess of slack in the tape leading from the tape holding means into the mailing machine. The wrap spring clutch 106 is fully described and claimed in the aforementioned U.S. patent application Ser. No. 685,783, and is further described herein only to the extent necessary for a full understanding of the present invention.

The tape holding means also includes a tape tensioning mechanism, which is also fully described and claimed in the aforementioned copending U.S. patent application Ser. No. 685,783, and therefore is further described herein only to the extent necessary for a full understanding of the present invention. The tape tensioning mechanism comprises a tensioning roller 110 (FIG. 3) which is rotatably mounted on a shaft 112 suitably connected to one end of a tensioning arm 114 which is pivotally mounted on a shaft 116 projecting outwardly from the rear face of the wall 48. By this arrangement, the tensioning roller 110 can move up and down in the arcuate slot 118 formed in the wall 48. As best seen in FIG. 5, the tape T is threaded over the tensioning roller 110 and then under a guide roller 120 rotatably mounted on a shaft 122 projecting outwardly from the front face of the wall 48, and from there the tape passes into a feed roller assembly 124 mounted in the mailing machine 14 adjacent the end wall 16. The tensioning arm 114 is normally biased upwardly by a tensioning spring 126 so as to maintain tension on the tape T between the roll 102 and the feed roller assembly 124 of the mailing machine. The tensioning arm 114 has a stub shaft 126 mounted above the shaft 116 which projects forwardly through a slot 128 formed in the wall 48 so as to engage a free tang 130 of the spring 132 of the wrap spring clutch 106. The other tang 134 is captured in one of a plurality of slots 136 formed in the front face of the wall 48. The arrangement is such that when the tension in the tape T pulls the tensioning roller 110 down against the bias of the tensioning spring 126, the stub shaft abuts the free tang 130 and moves it in an unwinding direction with respect to the spool assembly 100 so as to permit the spool assembly 100 to rotate and unwind additional tape T from the tape roll 102.

The tape holding apparatus also includes a device for detecting when the roll of tape 102 is exhausted and requires replacement, and also for providing an appropriate visual indication of this condition. The end of roll detecting device operates in conjunction with the tape tensioning mechanism since there is a sudden loss of all tape tension on the tensioning roller 110 when there is no tape T to pull the tensioning roller 110 down against the bias of the tensioning spring 126. Thus, as best seen in FIG. 4, a horizontally oriented rod 140 is slidably mounted in suitable bearing 142 formed on the rear surface of the wall 48, the rod having a vertically extending end portion 144 which moves laterally in guide slot 148 also formed in the rear surface of the wall 48. A compression spring 150 is captured between one side of the bearing 142 and an abutment 152 formed on the rod 140 so as to normally urge the rod toward the left as viewed in FIG. 4. The other end of the rod 140 carries a flag 154 and a magnet 156 to move therewith. A stub shaft 158 is mounted on the tensioning arm 114 adjacent the lower end thereof in a position to contact the vertically extending end portion 144 of the rod 140 when the tensioning arm 114 is in the vertical position shown in FIG. 4, which is the position it assumes in response to the force of the tensioning spring 126 when there is no tape T present to oppose the spring force. When the

stub shaft contacts the end portion 144 of the rod 140, it moves the rod 140 toward the right so that the flag 154 is no longer visible through an opening 160 (FIG. 3) in the wall 48, and it also moves the magnet 156 to a position where it activates a suitable switch which energizes a control panel indicator on the mailing machine to advise the operator that the roll of tape 102 is exhausted. If desired, the magnet 156 could also operate a switch that would prevent further operation of the mailing machine until a fresh roll of tape is inserted into the tape storage apparatus.

A description of the operation of the tape storage apparatus as described above will now be given. FIGS. 1 and 5 show the tape storage apparatus 10 in the position it occupies in relation to the mailing machine 14 and the stacker 12. In this position, it is apparent that the tape storage apparatus 10 is functionally integrated with the mailing machine to feed tape directly from the apparatus 10 to the feed roller assembly 124 of the mailing machine 14 along the path represented by the tape T. It should be apparent from FIG. 1 that when the apparatus 10 is in this position, it is inaccessible to an operator either for installation of a roll of tape to replace an exhausted roll or for general service which can be performed without complete disassembly of the tape storage apparatus. Also, it should be apparent that it is impossible to thread the lead edge of a new roll of tape around the tensioning roller 110, the idler roller 120, and into the feed roller assembly 124 of the mailing machine when the tape storage apparatus 10 is in the FIG. 1 position.

During normal operation of the tape storage apparatus 10 in the lowermost or operative position shown in FIGS. 1 and 5, the tape is threaded along the path T, the latch finger 78 is extended through the opening 80 in the base 30 and is engaged with the underside of the base 30 to maintain the housing 44 in the operative position against the force of the springs 55 and 64 tending to raise it. In the static condition of the apparatus 10, the wrap spring clutch 106 is engaged to prevent rotation of the roll of tape 102, but when the feed roller assembly 124 of the mailing machine 14 is activated to draw tape T from the tape storage apparatus 10, the tensioning roller 110 is pulled downwardly to the point where the stub shaft 126 on the tensioning arm 114 abuts the free tang 130 of the clutch spring 132, causing the spring 132 to disengage the clutch and permit the roll of tape 102 to rotate in an unwinding direction until there is sufficient slack in the path of the tape T to permit the tensioning roller 110 to return to its original position under the force of the tensioning spring 126, allowing the wrap spring clutch 106 to reengage and prevent further rotation of the roll of tape 102.

When the roll of tape is exhausted, the end of the strip of tape passes beyond the tensioning roller 110 which is then free to permit the tensioning arm to move to a vertical position as seen in FIG. 4, at which time the stub shaft 158 on the bottom of the tensioning arm 114 abuts the end portion 144 of the rod 140 to move the rod 140 toward the right as viewed in FIG. 4 against the force of the spring 150. This in turn moves the flag 154 out of view through the opening 160 in the wall 48 and also moves the magnet 156 to engage the aforementioned switch or switches to energize a visual out of tape indicator on the mailing machine and, if desired, to deactivate the mailing machine until a new roll of tape is inserted into the tape storage apparatus 10.

In order to replace the exhausted roll of tape and thread the lead end through the tape path indicated by the tape T in FIG. 5, as well as to render the apparatus accessible for any other form of service, it is necessary to open the door 22 and raise the apparatus 10 to the uppermost position shown in FIGS. 2 and 6. This is accomplished by first pressing on the push button 88 to depress the rod 84 against the bias of the spring 92, which in turn rotates the bell crank 72 in a clockwise direction to move the latch finger 78 toward the aperture 80. This allows the housing 44 to move upwardly under the force of the leaf spring 55, which produces a rather sharp and sudden upward movement, but only for a short distance. The essential function of the spring 55 is to abruptly accelerate the housing upwardly so that there is virtually instantaneous acceleration of the housing 44 which induces substantial kinetic energy in the housing 44. Immediately after the housing moves out of contact with the leaf spring 55, the torsion spring 64 starts driving the shaft 60 and the pinions 58 attached thereto in a direction to cause the pinions 58 to move up the racks 56, thereby carrying the entire housing 44 upwardly toward the top 42 of the guide member 36. The torsion spring 64 purposely does not have sufficient torque to drive the housing 44 all the way to the top so that it does not slam into the top of the guide member 36 and cause damage, but rather drives the housing 44 to within a short distance of the top. When it stops, the operator grasps a handle 162 (FIGS. 1 and 2) formed on the upper end of a rectangular enclosure 164 which is suitably attached to the rear portion of the housing 44 merely to enclose it. When the housing reaches its uppermost position on the guide member 36, the projections 96 snap into the detents 98 and retain the housing 44 in this position.

As best seen in FIG. 6, when the housing 44 is in the uppermost or inoperative position, the tensioning roller 110 is disposed at the bottom of the arcuate slot 118 and the tape path indicated by the tape T is very nearly straight leading from the bottom of the tape roll 102 to the feed roller assembly 124 of the mailing machine 14, thereby greatly facilitating threading the tape T into the feed roller assembly. Also, when the tensioning roller 110 is in this position, the stub shaft 126 on the tensioning arm 114 has moved the free tang 130 of the spring 132 of the clutch assembly 106 in an unwinding direction to permit the roll of tape 102 to rotate freely during the threading operation. After the new tape T has been threaded into the feed roller assembly 124 of the mailing machine, the operator pushes the housing 44 downwardly, thereby releasing the protrusions 96 from the detents 98, until the latch finger 78 passes through the aperture 80 and again latches against the underside of the base 30, thereby returning the housing 44 to the position shown in FIGS. 1 and 5 and closes the door 22. It will be apparent to skilled in the art that various modifications and additions may be made to the present invention without departing from the spirit and scope thereof, and it should be understood that the scope of the invention shall be limited only to the extent required as defined in the appended claims.

What is claimed is:

1. A tape storage apparatus for use with a mailing machine having means for printing postage indicia on a discrete portion of a strip of tape of indefinite length which is fed along a tape path extending through the mailing machine by tape feeding means mounted within

the mailing machine, said tape storage apparatus comprising:

- A) a base adapted to be connected to the mailing machine adjacent to an entrance to the tape path extending through the mailing machine,
- B) a substantially vertically oriented guide means extending upwardly from said base,
- C) tape holding means for holding a roll of tape and having means defining a tape path extending from the roll of tape to a tape exit location from said tape holding means,
- D) means mounting said tape holding means for movement along said guide means between a lowermost position in which said tape holding means is inaccessible in the mailing machine, and an uppermost position in which said tape holding means becomes accessible for replacement of a roll of tape and for threading the tape along said tape path and into the entrance to the tape path in the mailing machine,
- E) releasable latching means for normally latching said tape holding means in said lowermost position, and
- F) means for moving said tape holding means upwardly toward said uppermost position when said latching means is released, whereby said tape holding means is normally maintained in a position in which the tape roll is situated for feeding of tape along said tape path in said tape holding means and into the tape path extending through the mailing machine and can be moved to a position in which the tape roll becomes accessible for replacement of the tape roll and for threading of tape along said tape path in said tape holding means into the tape path extending through the mailing machine.

2. A tape storage apparatus as set forth in claim 1 wherein,

- A) said guide means comprises means defining a pair of spaced apart guide rails extending upwardly from said base a predetermined distance, and
- B) said means mounting said tape holding means for movement along said guide means comprises means connected to said tape holding means for sliding along each of said rails over said predetermined distance.

3. A tape storage apparatus as set forth in claim 2 further comprising resilient means for biasing said tape holding means in an upward direction when said latching means is released.

4. A tape storage apparatus as set forth in claim 3 wherein said resilient means comprises:

- A) a first resilient means interposed between said base and a lower portion of said tape holding means and adapted to exert an upward force on said tape holding means for a limited distance of movement to move said tape holding means out of contact with said base, and
- B) a second resilient means operatively interconnected between said guide means and said tape holding means and adapted to exert an upward force on said tape holding means sufficient to raise said tape holding means at least a substantial distance along said guide means beyond limited distance of movement caused by said first resilient means.

5. A tape storage apparatus as set forth in claim 4 wherein said second resilient means comprises:

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- A) a vertically oriented rack mounted on said guide means,
 - B) a pinion rotatably mounted on said tape holding means, and
 - C) spring means interconnected between said pinion and said tape holding means for normally driving said pinion in a direction to cause said pinion to rise along said rack, to drive said tape holding means upwardly said substantial distance along said guide means.
6. A tape storage apparatus as set forth in claim 5 wherein said spring means comprises:
- A) a horizontally oriented shaft rotatably mounted on said tape holding means, said pinion being fixedly mounted on said shaft, and
 - B) a torsion spring mounted on said shaft, one end of said torsion spring being connected to said shaft, the other end of said torsion spring being connected to said tape holding means, said spring being prewound on said shaft in a manner to cause said pinion to rise along said rack to drive said tape holding means upwardly said substantial distance along said guide means.
7. A tape storage apparatus as set forth in claim 1 wherein said releasable latching means comprises:
- A) a latch member movably mounted on a lower portion of said tape holding means,
 - B) means on said base beneath said latch member for normally engaging with said latch member when said tape holding means is in said lowermost position, and
 - C) manually operable means mounted on said tape holding means for releasing said latch member from said engaging means to permit said tape holding means to move upwardly along said rails in response to said moving means.
8. A tape storage apparatus as set forth in claim 1 wherein said tape holding means further includes tape tensioning means for maintaining the tape between said roll of tape and the tape feeding means of the mailing machine taught while tape is being withdrawn from said tape holding means by the tape feeding means of the mailing machine.

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9. A tape storage apparatus as set forth in claim 8 wherein said tape tensioning means comprises:
- A) a wrap spring clutch for preventing rotation of said roll of tape in an unwinding direction when said wrap spring clutch is engaged and for permitting free rotation of said roll of tape when said wrap spring clutch is disengaged, and
 - B) means for engaging said wrap spring clutch to prevent rotation of said roll of tape in an unwinding direction when tape is not being withdrawn by the feeding means in the mailing machine, and for disengaging said wrap spring clutch when tape is being withdrawn by the feeding means in the mailing machine and the pulling force on the tape exceeds a predetermined amount and also when said tape holding means is moved to said uppermost position to permit said roll of tape to rotate in an unwinding direction.
10. A tape storage apparatus as set forth in claim 9 wherein said means for engaging and disengaging said wrap spring clutch comprises means interconnected between said tape holding means and said tape tensioning means for actuating said wrap spring clutch engaging and disengaging means of said tape tensioning means.
11. A tape storage apparatus as set forth in claim 9 wherein said tape tensioning means further includes means for detecting when said roll of tape is exhausted and for providing an indication of this condition.
12. A tape storage apparatus as set forth in claim 11 wherein said means for detecting when said roll of tape is exhausted comprises:
- A) an element mounted on said tape holding means for movement in response to changes in the pulling force on the tape,
 - B) resilient means urging said element in a direction opposite to that in which it is moved by the normal pulling force on the tape, and
 - C) means responsive to said element being moved to a limit position by said resilient means for providing a visual indication that said element is in said limit position and is no longer under the influence of tape.

* * * * *

United States Patent [19]

Kulpa et al.

[11] Patent Number: 4,744,554

[45] Date of Patent: May 17, 1988

[54] DESKEWING DEVICE FOR MAILING MACHINE

[75] Inventors: Walter J. Kulpa, Trumbull; Aaron M. Albert, Bridgeport, both of Conn.

[73] Assignee: Pitney Bowes Inc., Stamford, Conn.

[21] Appl. No.: 917,881

[22] Filed: Oct. 10, 1986

[51] Int. Cl.⁴ B65H 9/16

[52] U.S. Cl. 271/251

[58] Field of Search 271/250, 251, 248

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Attorney, Agent, or Firm—Charles G. Parks, Jr.; David E. Pitchenik; Melvin J. Scolnick

[57] ABSTRACT

An improved deskewing device for a postage meter mailing machine comprising a support mounted over an upper surface of the mailing machine feed deck. A first feed roller is rotatably mounted on the support upstream from the postage meter with the axis of the first feed roller disposed at an angle within the range of 5 to 30 degrees to the registration guide and spaced laterally from the feed deck registration guide at approximately 0.75 inches. A drive rotates the first feed roller. Mounted in the feed deck is semispherical member directly below the first feed roller. A drag is mounted to the support upstream from the postage meter for encountering the envelope and applying thereto a drag force parallel to the registration guide and counter directional to the envelope traversing direction, the drag being spaced laterally from the registration guide approximately 3.0 inches therefrom and upstream from the first feed roller approximately 0 to 0.6 inches therefrom.

Primary Examiner—Richard A. Schacher

8 Claims, 4 Drawing Sheets

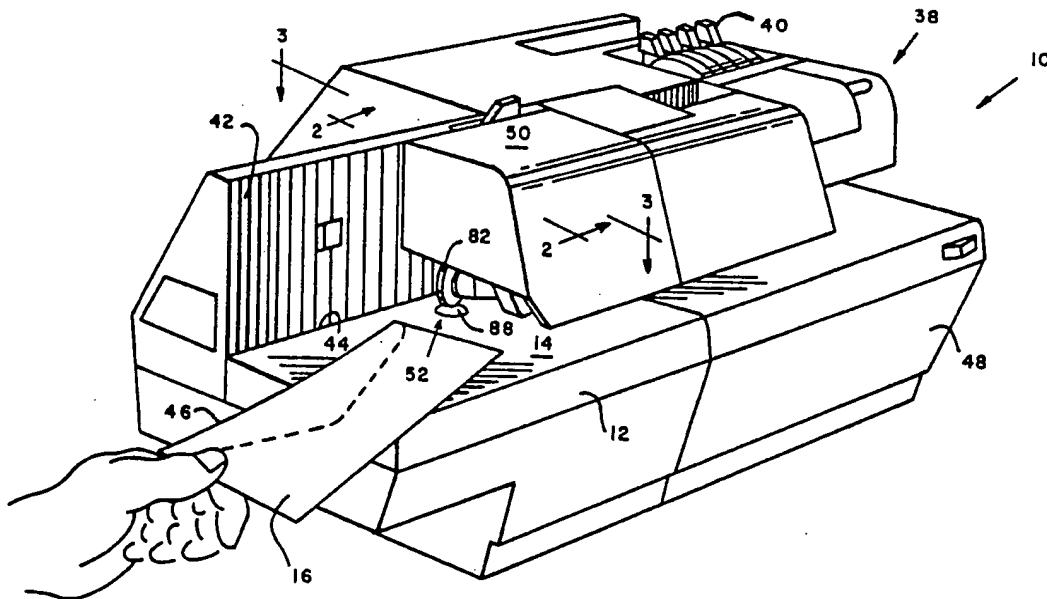


FIG. 1

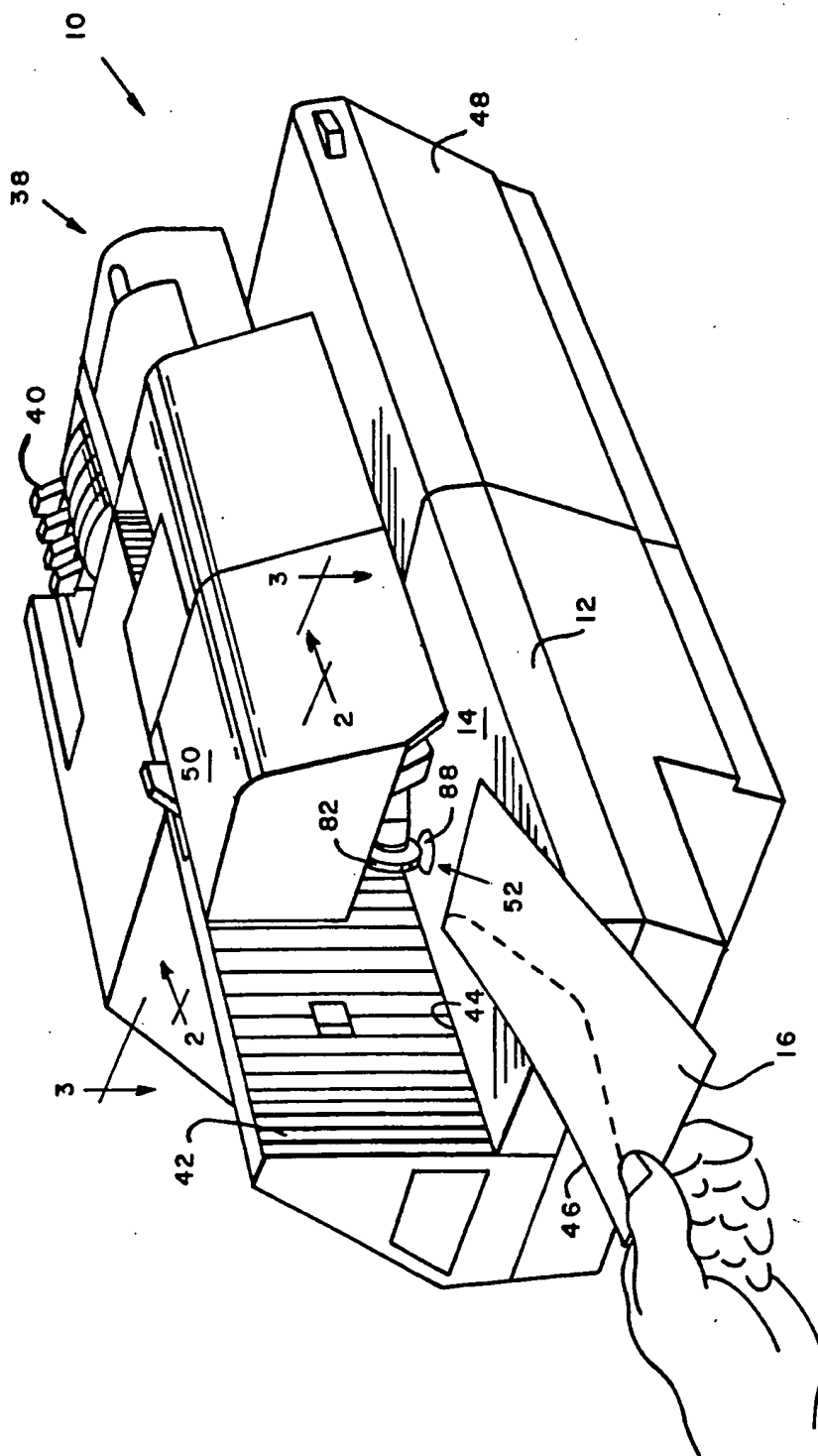
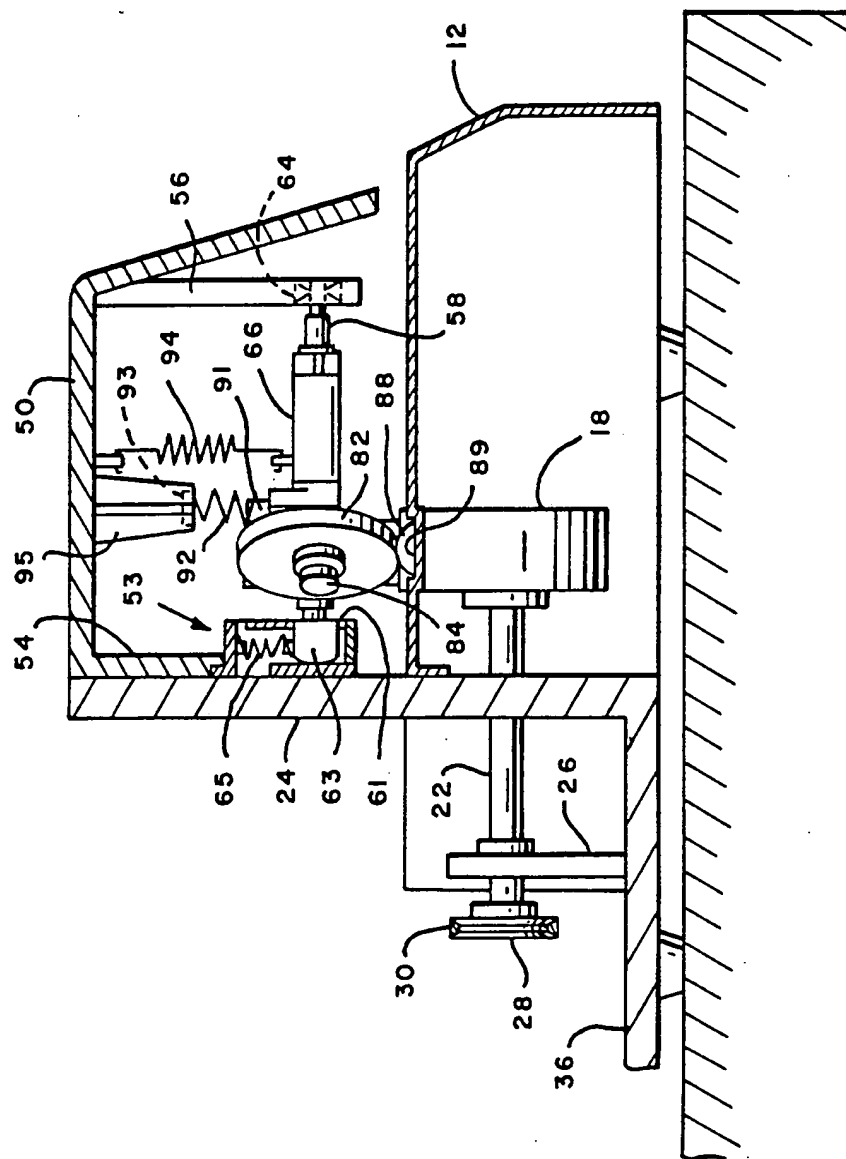


FIG. 2



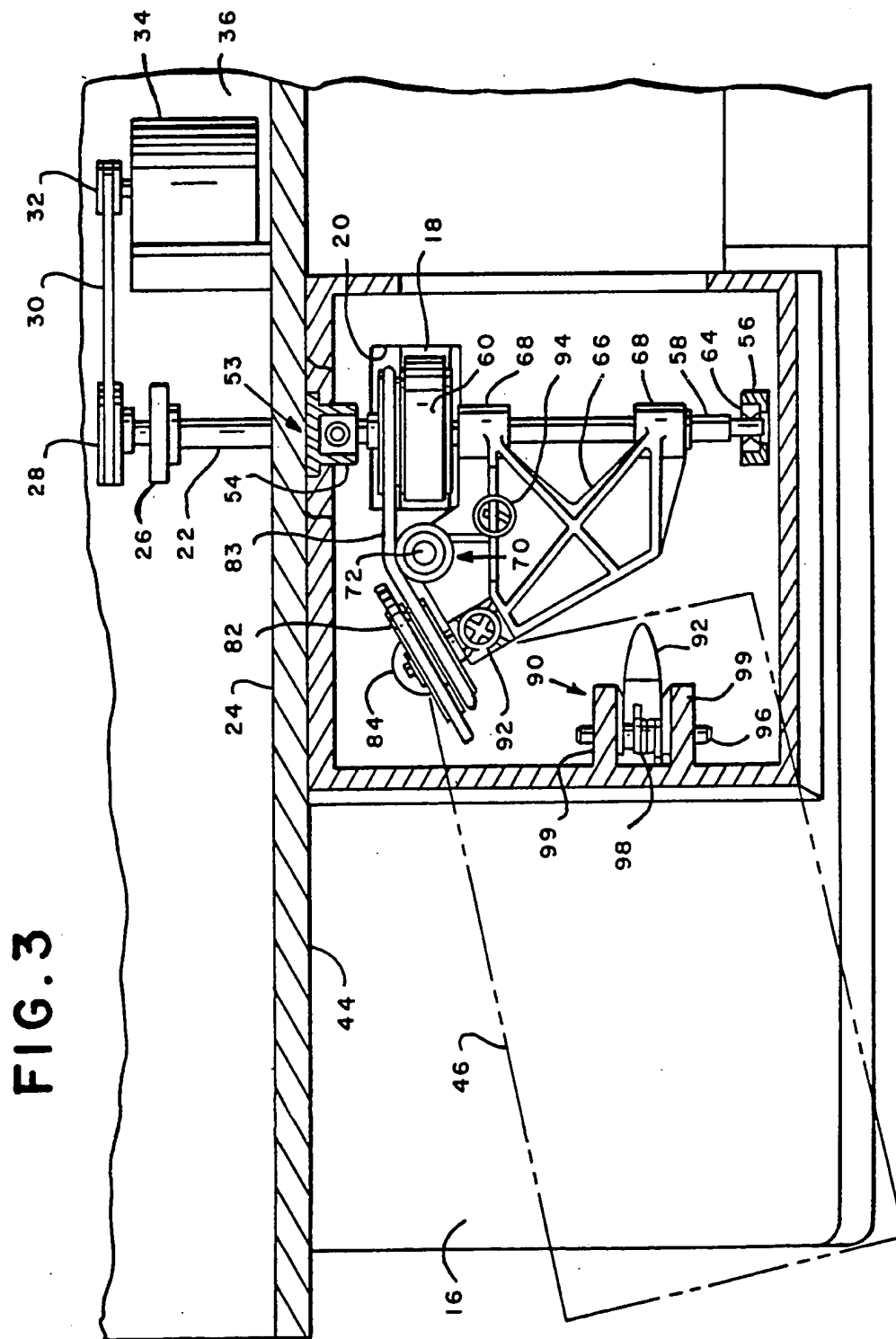
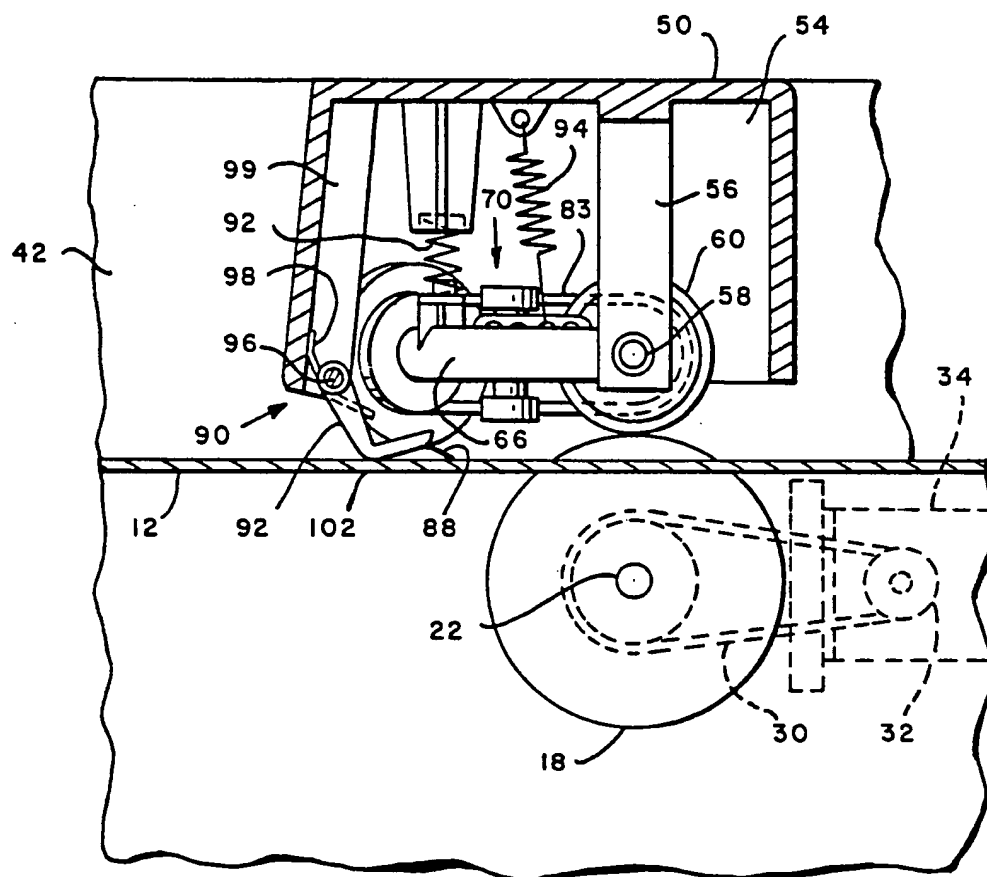


FIG. 4



DESKEWING DEVICE FOR MAILING MACHINE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to an improvement in mailing machines and, more particularly, to an envelope deskewing device for a mailing machine which prints postage indicia in a predetermined location on envelopes.

Mailing machines are well known in the prior art and are found in post offices and in mailrooms of companies and business offices the world over. Typically, a mailing machine comprises a feed base having an elongate deck which presents a flat surface on which envelopes can be fed one at a time and a feeding mechanism for feeding the envelopes. Mailing machines may be either hand fed, in which case an operator places a single envelope on the feed deck and slides it into engagement with the feeding mechanism, or automatically fed wherein envelopes are fed seriatim from a stack held in a suitable hopper and transferred across the feed deck.

The mailing machine also includes a postage meter which, with a few exceptions, is removably connected to the feed base. The postage meter, as is well known, is basically a printing device which prints a particular type of postage indicia on the envelope adjacent the upper right hand corner, the printed postage indicia serving in lieu of a postage stamp as proof of payment of the postage charge. Typically, the postage meter has settable printing wheels to facilitate selecting different amounts of postage and dates to be printed, and there are suitable mechanical or electronic means for setting the printing wheels and for keeping track of the amount of postage printed for accounting and security purposes.

The present invention is particularly useful in the hand fed type of mailing machine, but may also be utilized to advantage in automatic mailing machines. In either case, envelopes must be fed through the mailing machine in proper alignment with the printing drum of the postage meter in order to have the postage indicia printed in a precise location and orientation on the envelopes. It is important that the postage indicia be printed in a precise location and orientation in order to assure that there is no loss of any portion on the postage indicia, which would violate federal regulations covering metered mail, and also to assure that there is no loss of the customer's advertising slogan and/or design which may be printed by the meter which would offend the customer. These malfunctions are made possible by the typical mailing machine design. The postage meter is triggered by the lead edge of the envelope striking a trip actuator or energizing an electronic receiving device to signal the arrival of the envelope at a known location. If the envelope is moving through the mailing machine in a skewed relationship, the portion of the envelope which triggers the operation of the postage meter will not be in the proper location when it engages the triggering device, thereby actuating the postage meter either too soon or too late.

Another reason for the importance of feeding the envelopes through the mailing machine in proper registration with the printing drum is to avoid damage to the envelope in other portions of the mailing machine. Typically, mailing machines are provided with a moistening and sealing device upstream from the printing drum of the postage meter. If an envelope is fed through the

moistening component in other than a substantially properly aligned orientation, there is a high probability that the flap of the envelope will catch and tear on the moistening component and the envelope will not be properly sealed. It is also quite possible that the tearing of the flap could cause the envelope to jam in the mailing machine and cause a complete malfunction.

After recognizing the importance of providing a deskewing device in a mail handling machine for any one or more of the reasons mentioned above, it was discovered that there is a limitation to the amount of misregistration with which an envelope can be placed on the feed table and still have it become properly registered by the deskewing device before the envelope reaches the printing drum of the postage meter. Prior means have been developed for deskewing an envelope, particularly U.S. patent application Ser. No. 808,198, entitled "Deskewing Device For Mailing Machine", filed Dec. 12, 1984 and assigned to Pitney Bowes, Inc. However, the deskewing device described in the cited application has an expressed entry angle limitation, i.e., the device will properly align an envelope relative to the register provided the angle of entry to the deskewing devices does not exceed 12 degrees.

BRIEF SUMMARY OF THE INVENTION

The present invention is intended to obviate or eliminate the disadvantages and problems discussed above in connection with known mailing machines and improve upon the acceptable entry to the prior deskewing device.

In its broader aspects, the present invention is utilized in a mailing machine having a substantially horizontal envelope feed deck, an elongate registration guide extending along one side edge of the feed deck, a driven rotary frictional drive element mounted beneath the feed deck and protruding upwardly through an opening therein, and a postage meter mounted on the feed deck in a downstream direction from the rotary frictional drive element in position to print postage indicia in a predetermined location on an envelope being fed along the feed deck. The envelope deskewing device comprises a support means mounted over an upper surface of the feed deck, a first rotary frictional drive means mounted on the support means for feeding envelopes along the feed deck in a direction parallel to the registration guide with an edge of the envelopes abutting the registration guide, and a second rotary frictional drive means mounted on the support means and the feed deck upstream from the first rotary frictional drive means for receiving envelopes placed on the feed deck in a random orientation ranging from parallel to the registration guide to a predetermined maximum angle with respect thereto, and for feed envelopes so placed on the feed deck toward the registration guide, thereby aligning the envelopes with the registration guide. The device is also provided with means for driving the first and second rotary frictional drive means in synchronism from the driven rotary frictional drive element. A drag means is pivotal mounted on the support means adjacent the second rotary frictional drive means in position to encounter the envelope being fed by the second rotary frictional drive means if the envelope is placed on the upper surface of the feed deck at an angle to the registration guide which is in the excess of the predetermined angle.

In its preferred embodiment, the first rotary frictional drive element comprises a first feed roller rotatably mounted over the driven rotary frictional drive element and is driven thereby. The second rotary frictional drive means comprises a second feed roller driven in synchronism with the first feed roller and mounted with its axis at an angle to the registration guide, and a semi-spherical member mounted in the feed deck in driving engagement with the second feed roller. The drag means comprises a generally finger shaped member pivotally mounted to the support means and biased downwardly against the upper surface of the feed deck.

As an envelope is placed on the feed deck at an angle in excess of the predetermined angle, the top surface of the envelope strikes the bottom surface of the drag member. The drag forces applied to the envelope in combination with the drive forces acting on the envelope imparted by the second frictional drive means cause the envelope to deskew.

Objects and advantageous features of the present invention will be more readily apparent from an understanding of the following detailed description of a presently preferred embodiment of the invention when considered in conjunction with the accompanying drawings in which:

FIG. 1 is an isometric view of the typical mailing machine embodying the present invention and showing an envelope being placed on the feed deck of the mailing machine;

FIG. 2 is a vertical sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a horizontal sectional view taken on the line 3—3 of FIG. 1;

FIG. 4 is a partial front view of the feeding and abutment assembly of the present invention; and

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, and more particularly to FIG. 1 thereof, there is shown a mailing machine generally designated by the reference numeral 10 in which the present invention is embodied and which is an improvement over prior known mailing machines. The mailing machine 10 comprises an elongate feed deck 12 usually extending from one end of the machine to the other, the feed deck having an upper surface 14 along which envelopes 16 are adapted to be fed. As seen in FIGS. 2, 3 and 4, the mailing machine also comprises a driven rotary frictional drive element, particularly the feed roller 18 mounted beneath of feed deck 12 and projecting upwardly through a suitable elongate opening 20 formed in the feed deck 12. The feed roller 18 is mounted on a shaft 22 rotatably mounted in a wall 24 and an adjacent parallel wall 26, and is driven through a pulley 28 driven by a belt 30 which is driven by a pulley 32 mounted on the output shaft of a motor 34 suitably mounted on a portion of the mailing machine base 36.

The mailing machine also comprises a postage meter generally designated by the reference numeral 38 and is located adjacent the downstream end of the feed deck 12 beyond the feed roller 18 in the direction of movement of the envelopes 16. The postage meter 38 is very well known in the art and includes a rotatable printing drum which prints a distinctive postage indicia in a predetermined location on envelopes passing under the printing drum typically in the upper right hand corner of the envelope. The printing drum has settable printing

wheels by which the amount of postage printed and the date can be changed at will. A plurality of levers 40 project from the postage meter by which the printing wheels for the amount of postage are set. Other details of the construction and operation of the postage meter are not part of the present invention and are therefore omitted from this description.

The mailing machine 10 also includes an upstanding rear wall 42 the lower edge of which constitutes a registration guide 44 along which the upper longitudinal edge 46 of the envelope 16 must ride in order for the envelope 16 to be properly positioned when it passes under the printing drum of the postage meter 38. If the envelope 16 is not travelling parallel to the registration guide 44 when the postage indicia is printed thereon the indicia will be misaligned and possibly improperly printed on the envelope.

The mailing machine 10 further includes a base housing 48 and another housing 50 which contains a portion of the feed deck 12 for a purpose to be hereinafter made clear.

As seen in FIG. 1, the mailing machine 10 is of the single feed or hand fed type, that is, envelopes are manually placed one by one on the upper portion 14 of the feed deck 12 and are pushed into the feeding mechanism of the mailing machine. There is no automatic feeding device by which a stack of envelopes are automatically fed one after another into the mailing machine. In typical practice, when envelopes are manually placed on the feed deck, they are skewed at an angle to the longitudinal axis of the feed deck 12 and similarly skewed to the registration guide 44, unless the operator exercises great care in placing the envelope on the feed deck. Even with the registration guide 44, a certain amount of time and effort are required by the operator to assure that the upper edge 46 of each envelope 16 placed on the feed deck 12 is in contact with the registration guide 44 and remains in contact therewith while the envelope is being pushed into engagement with the feeding mechanism of the mailing machine. Obviously this greatly diminishes the rate at which envelopes can be fed through the mailing machine and thereby decreases the capacity of the machine. To overcome this drawback, the present invention comprises a deskewing device built into the mailing machine which receives envelopes placed on the feed deck 12 in a random orientation ranging from parallel with the registration guide 44 to a predetermined maximum angle with respect thereto and which feeds an envelope placed in the feed deck in an orientation other than parallel with the registration guide 44 toward the registration guide 44 so as to change the direction of feed of such envelope to parallel with the registration 44, thereby assuring that the envelope will be properly aligned with the feed deck and the printing drum of the postage meter when the envelope passes thereunder. In the preferred embodiment of the invention, the predetermined maximum angle is equal to approximately 45 degrees.

The envelope deskewing device, generally designated by the numeral 52 in FIG. 1, is mounted on a portion of the housing 50 in overlying relationship with the feed deck 12, the details of the deskewing device best appearing in FIGS. 2-4. As best seen in FIGS. 2 and 3, the housing 50 includes a side wall 54 flexible mounted by any conventional means to a upper portion of wall 24. A hub assembly 53 is fixably mounted by conventional means in side wall 54. Vertically suspended from the housing 50 in spaced relationship to

the hub assembly 53 is a wall 56. The hub assembly 53 and wall 56 rotatably support a shaft 58. A first rotary frictional drive means in the form of a feed roller 60 is rotatably mounted on the shaft 58 in position to normally engage the feed roller 18 mounted beneath the feed deck 12 and projecting through the opening 20. As best seen in FIG. 2, the hub assembly 53 is provided with a vertical slot 61 in which slot a hub 63 is permitted a limited amount of up and down movement. The hub 63 rotatably supports one end of the shaft 58 which projects through the slot 61 which in turn permits the feed roller 60 to separate sufficiently from the roller 18 to accommodate envelopes of varying thickness. The hub 63 is biased in the down position by a captured spring 65. The other end of the shaft 58 pivots about a spherical bearing 64 in response to the feeding of envelopes of different thickness.

An elongate support frame 66 is pivotally mounted on the shaft 58 by means of a pair of hinge arms 68, and extends in an upstream direction. A pair of intermediate guide rollers generally designated by the reference numeral 70 are rotatably mounted in spaced apart relationship on the support frame by means of a vertically directed stub shaft 72. The stub shaft 72 extends perpendicular to shaft 58 to provide a axis of rotation for guide rollers 70 perpendicular to the rotational axis of feed roller 60.

A second rotary frictional drive means in the form of a feed roller 82 is rotatably mounted on the upstream end of the support frame 66 by means of a stub shaft 84. A endless drive belt 83 extends partially around a circumferential portion of the feed rollers 60 and 82 to provide driving communication from feed roller 60 to feed roller 82. The drive belt 83 also encounters portions of guide roller 70 for providing belt deflection such that the belt 83 assumes a proper tracking angle around feed rollers 60 and 82. It is apparent from the figures that the axis of the roller 82 is disposed at the same angle to and transversely displaced from the registration guide 44. In the preferred embodiment, the roller axis is set at an angle of between 20 to 40 degrees, 30 degrees being the preferred angle, and is spaced from the registration guide 44 at 0.8 to 1.5 inches, 1.0 inches being the preferred displacement. A semi-spherical member 88 is fixable received in a depression 89 in the feed deck 12 on which the feed roller 82 rests, the roller 82 and member 88 constituting part of a rotary frictional drive means carried by the support frame 66 and the feed deck 12, the roller 60 and the intermediate guide rollers 70 being the other part of the rotary frictional drive means. As can best be seen from FIG. 3, the envelope 16 which is placed on the upper surface of the feed deck 12 and which is not in contact with the registration guide will be fed toward the registration guide 44 by the feed roller 82.

In order to provide a proper and uniform feed pressure between the roller 82 and the member 88, the support frame 66 is urged downwardly by the compression spring 65 receiving assistance from a spring 91 after a predetermined upward deflection of the support frame 66. Spring 91 is captured between the upper surface of the frame 66 and the undersurface of the housing 50. That is, the bottom end of the spring 91 rests on the support frame 66 partially around a vertically directed tab 93 formed on the frame 66. The upper end of spring 91 is received in a well 95 formed in a post 97 which post 97 is formed and located within the housing 50. It is noted that in the nominal condition, i.e., when roller

82 is resting on semispherical member 88, the spring 91 is in a relaxed state and is only placed into compression and thereby assisting spring 65 when the roller 82 has been separated from the member 88 by a traversing envelope a distance greater than 1/16 of an inch.

A tension spring 94 is also engaged between the upper surface of the support frame 66 and the undersurface of the housing 50 and pulls upwardly on the support frame 66. The tension spring 94 is employed to equalize the torque caused by driving force of the roller 82 on thin envelopes.

As best viewed in FIG'S 3 and 4, the deskewing device is provided with a drag means, generally indicated as 90, mounted on the support frame generally adjacent the rotary frictional drive means in position to exert a drag force on an envelope being fed by the roller 82 should an envelope be placed on the feed deck at an angle relative to the registration guide 44 from which the device is capable of aligning before the envelope reaches the rollers 60 and 18. The drag means 90 is comprised of a finger 92 which has a generally L-shape. The finger 92 is pivotally mounted on the forward wall of the housing 50 between flanges 99 along a stub shaft 96. A spring 98 is located around a portion of stub shaft 96 in such a manner as to bias the lower portion of the finger 92 in a generally downwardly direction against the upper surface 14 of the feed deck 12. The finger 92 is located such that the contact point of the finger 92 with the deck surface 14 is laterally opposite to the contact point of feed roller 82 to member 88 at a distance just sufficient enough to apply a drag force to the narrowest envelope anticipated to traverse the mailing machine.

Referring back to FIG. 1, in operation, the envelope 16 is positioned such that its leading end is nearly abutting the envelope deskewing device 52. When the operator continues to forwardly position the envelope 16, the deskewing device 52 will accept the envelope 16 and register it for proper printing of the metered stamp. If the angle between the top of the envelope 16 and the registration guide 44 is 45° or less, the deskewing device 52 will automatically begin to cause the envelope 16 to turn in a clockwise direction until the top of the envelope 16 registers with the guide 44. The nip between the roller 82 and the semispherical member 88 continuously urges the envelope 16 downstream, while simultaneously being resisted by the lower surface 102 of the finger 92, that is, the envelope is subjected to a drag force.

The envelope 16 is drawn along the feed path causing the finger 92 to be pivoted upwards while continuing to bear upon the upper surface of the envelope 16. The normal force at the conveying nip between the roller 82, and the semispherical member 88 is sufficient to urge and deskew the heaviest mail piece acceptable for printing at the postage meter 38. While the envelope 16 continues moving along under urging by the roller 82, the feed roller 60 also assists in advancing the envelope.

Therefore, having described in detail, the deskewing device for a mailing machine, the advantages of which will be apparent, it will be recognized that modifications to the enclosed drawings or changes made to parts described in the foregoing specification will not in any way alter the spirit and scope of the appended claims.

What is claimed:

1. In a mailing machine having a substantially horizontal mailpiece feed deck, an elongate registration guide extending along one side edge of said feed deck, a

postage meter mounted on said feed deck in a downstream direction in position to print postage indicia in a predetermined location on mailpieces being fed along said feed deck wherein the improvement comprises:

deskewing means for causing a mailpiece longitudinally traversing said feed deck at a lengthwise angular relationship relative to said registration guide to be subjected to an alignment drive force and cooperatively acting alignment drag force which forces cause realignment of said mailpiece to be lengthwise parallel and side abutting to said registration guide.

2. In a mailing machine as claimed in claim 1, wherein said deskewing means comprises:

support means mounted over an upper surface of said feed deck;

a first rotary friction drive means mounted to said support means and said feed deck upstream from said postage meter for receiving a mailpiece placed on said feed deck in a random orientation ranging from parallel to said registration guide to a predetermined maximum angle with respect thereto, and for imparting to said mailpiece an alignment drive force at an acute angle relative to said registration guide, said first rotary friction drive means being in spaced relation to said registration guide;

drag means mounted to said support means and said feed deck upstream from said postage meter for encountering the said mailpiece and applying thereto a drag force parallel to said registration guide and counter to the mailpiece traversing directions, said drag means being in further spaced relationship to said registration guide;

whereby the resultant force profile causes said mailpiece to deskew and assume a parallel traversing direction relative to said registration guide.

3. In a mailing machine as claimed in claim 2 wherein said drag means is positioned slightly upstream of said first rotary friction drive means.

4. In a mailing machine as claimed in claims 2 or 3 wherein said drag means comprises a drag finger pivotally mounted to said support means and biasing means for biasing said finger in the direction of said feed deck surface.

5. In a mailing machine having a substantially horizontal envelope feed deck, an elongate registration guide extending along one side edge of said feed deck, a postage meter mounted on said feed deck in a downstream direction in position to print postage indicia in a predetermined location on envelopes being fed along

said feed deck, an improved deskewing means for causing an envelope longitudinally traversing said feed deck at a lengthwise angular relationship relative to said registration guide to be subjected to realignment by said deskewing means to assume a parallel alignment relative to said registration guide, wherein the improvement comprises:

support means mounted over an upper surface of said feed;

a first feed roller rotatably mounted on said support means upstream from said postage meter with the axis of said first feed roller disposed at an angle within the range of 20 to 40 degrees to said registration guide and spaced laterally from said registration guide approximately 0.8 to 1.5 inches;

drive means for drivingly rotating said first feed roller;

a semispherical member partly seated in said feed deck directly below said first feed roller;

drag means mounted to said support means and said feed deck upstream from said postage meter for encountering said envelope and applying thereto a drag force parallel to said registration guide and counter directional to the envelope traversing direction, said drag means being spaced laterally from said registration guide approximately 1.74 to 3.0 inches therefrom and upstream from said first feed roller approximately 0 to 1.4 inches therefrom.

6. In a mailing machine as claimed in claim 5 wherein said drag means comprises a finger pivotally mounted to said support means and biasing means for biasing said finger in the direction of said feed deck surface.

7. In a mailing machine as claimed in claim 6 further comprising:

a second rotary friction drive means mounted on said support means for feeding envelopes along said feed deck in a direction parallel to said registration guide with an edge of the envelopes abutting said registration guide longitudinally located between said first feed roller and said postage meter;

means for driving said first feed roller in cooperative speed rotation with said second rotary friction drive means.

8. In a mailing machine as claimed in claim 7 wherein said second rotary frictional drive means comprises:

a second feed roller rotatably mounted on said support means;

said drive means drivenly rotating said second feed roller in synchronization with said first feed roller.

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